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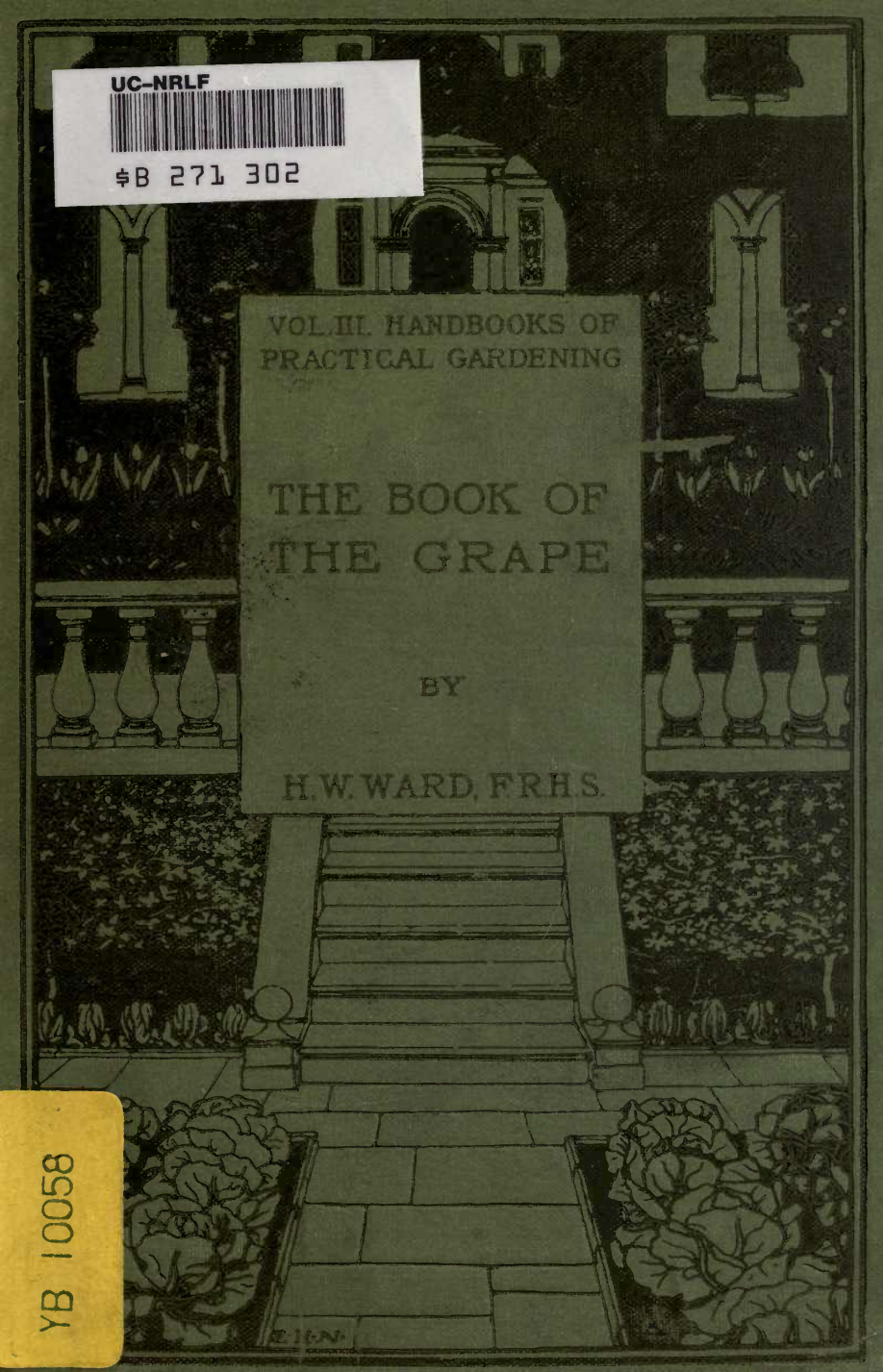

VOL. III. HANDBOOKS OF PRACTICAL GARDENING

THE BOOK OF THE GRAPE

BY

H. W. WARD, F.R.H.S.

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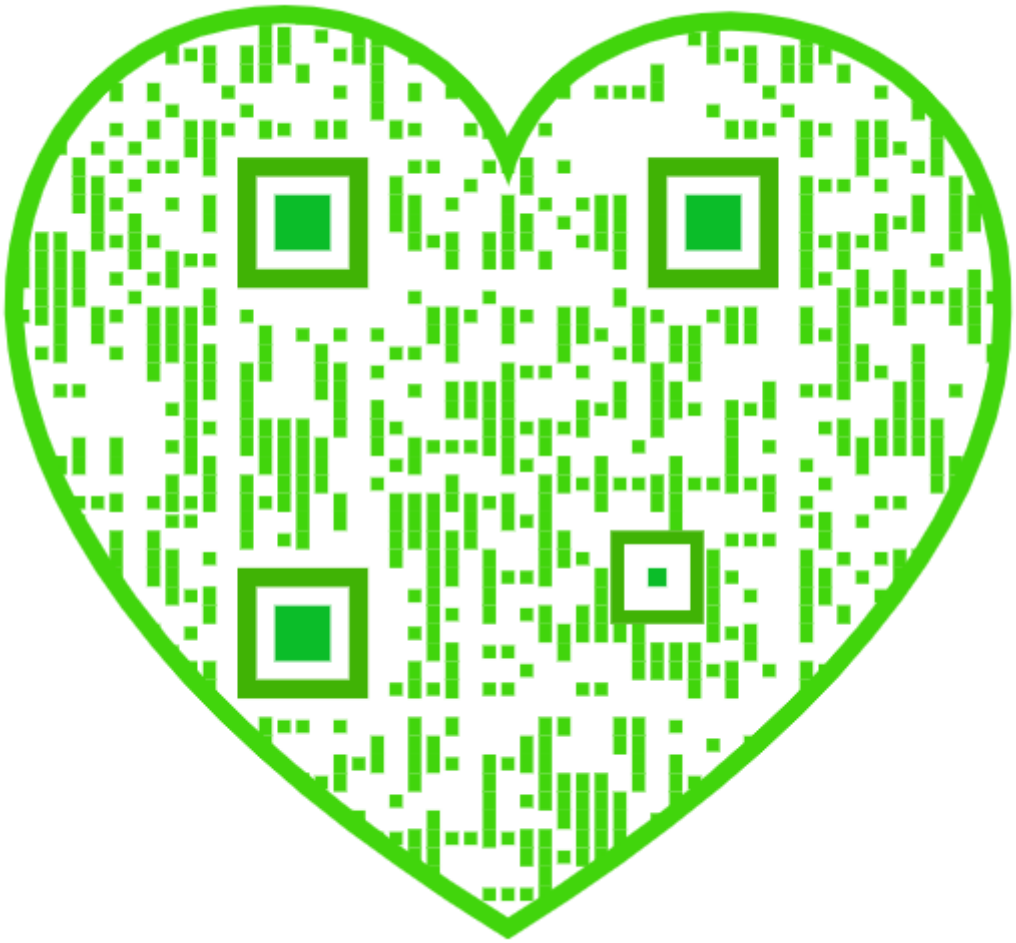
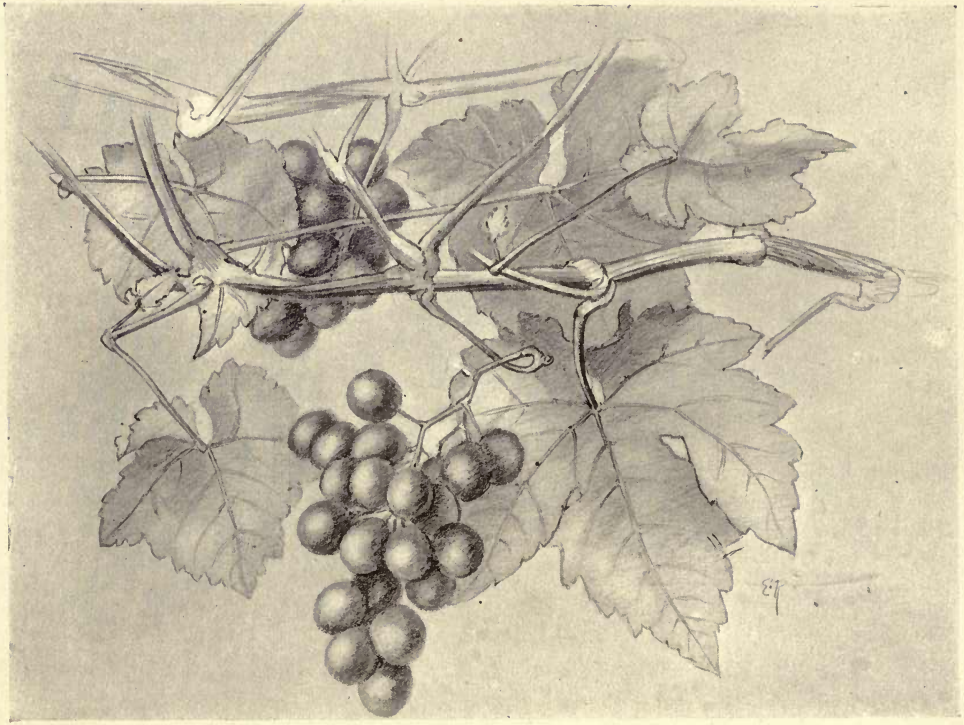


HANDBOOKS OF PRACTICAL GARDENING—III
EDITED BY HARRY ROBERTS

THE BOOK OF THE GRAPE



STUDY OF THE GRAPE VINE

THE BOOK OF THE GRAPE

BY

H. W. WARD, F.R.H.S.

FOR TWENTY-FIVE YEARS HEAD GARDENER AT LONGFORD CASTLE

AUTHOR OF "MY GARDENER"

TOGETHER WITH A CHAPTER ON THE DECORATIVE VALUE OF THE VINE BY THE EDITOR

JOHN LANE: THE BODLEY HEAD

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CONTENTS

	PAGE
Editor's Note	xi
The Decorative Value of the Vine	1
The Vine	9
Form and Dimensions of the Vinery	10
Construction of the Vinery	14
On Heating Vineries	19
Trellises for Vines	21
Ventilation	23
Suitable Composts for Vines	25
Making the Border	26
Select Varieties of the Grape Vine	29
Descriptive Remarks on the Selected Varieties	33
On Raising Young Vines	48
On Planting the Vines	50
On the Treatment of Vines—First Year	55
Treatment in Subsequent Years	57
Selecting and Thinning the Bunches	64
Watering the Vine Borders	66
Treatment after the Grapes are Cut	69
Houses containing Late Ripe Grapes	69
The Grape Room	70
Pruning Established Vines	71

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PAGE

Extension System of Pruning 73

Bleeding 74

Suitable Stocks for Vines 75

Inarching 77

Patching Vines in Full Growth 77

Packing Grapes 78

Treatment of Vines in an Ordinary Greenhouse . . 85

Fruiting Vines in Pots 86

Vines for Decoration 87

Vines in the Open 89

Diseases 91

ILLUSTRATIONS

	PAGE
Study of the Grape Vine (from a drawing by Ethel Roskruge)	*Frontispiece*
Vitis Davidiana	3
Vitis Thunbergiana	7
Vineries with Plant-House	11
Range of Vineries	15
Alnwick Seedling Grapes	31
Vitis Coignetiae	39
Cutting with Single Eye	48
Rooted Cutting with Single Eye	49
Cutting of Grape Vine	49
Vine Grafting—Scion and Stock	50
Vine Root Grafted	50
Vitis Flexuosa Major	59
Bunch of Grapes in Bottle	70
Mode of Stopping Lateral Shoot	72
Bashford's Fruit Packing Case	79
Bashford's Crate of Baskets	81
Bashford's Single Basket	83
Single Bunch Grape Stand	84
Grape Boards in Exhibition Box	85

EDITOR'S NOTE

Mr H. W. Ward, the author of the present volume, has been during almost his entire life actively engaged in various branches of gardening practice. His early training was obtained in the gardens of the Earl of Mansfield, at Scone Palace, Perth; of the Earl of Portarlington, at Ems Park; of the Duke of Athole, at Blair Castle; and of the late Earl Sydney, at Frognall, Foot's Cray. Mr Ward also gained experience in the nurseries of Messrs Drummond, and Messrs Dickson, of Edinburgh; in the Fort Prospect Nurseries of Limerick; and in the nurseries of Messrs John Laing of Forest Hill, and of Messrs Dickson & Turnbull of Perth. He was for twenty-five years head gardener to the Earl of Radnor at Longford Castle, Salisbury, and during that period he designed and supervised numerous alterations and extensions of importance. Mr Ward, whilst at Longford Castle, raised several varieties of fruits and vegetables which have since become well known to commerce, and was a very constant prize-winner at leading shows; obtaining also several medals from the Royal Botanic Society, and gold and silver Knightian medals from the Royal Horticultural Society.

For a great many years he has been a frequent contributor to *The Gardener's Chronicle* and other papers, and is the author of several little practical guides to garden work.

The Editor wishes to express his thanks to Canon Ellacombe for permission to obtain photographs of two

decorative vines growing in his garden; to Messrs Veitch for the illustrations of two pillar vines; to Messrs Collingridge for the illustrations of a fruit crate; and to Messrs Crispin for leave to illustrate some of their excellent structural work.

NOTE ON THE DECORATIVE VALUE OF THE VINE

By the Editor

The great antiquity of the grape-vine is a matter not open to dispute, for its leaves have even been discovered in the tufa at Montpellier, and grape seeds have been found in several lake dwellings which belong to the Bronze Age. It has been cultivated for many thousand years, for we are told that "Noah began to be an husbandman, and he planted a vineyard"; whilst Egyptian records of grape-growing and the making of wine carry us back to an even earlier date.

The vine seems to have been introduced into England in the second or third century after Christ, for, according to Tacitus, "Solum, practu oleam vitemque et caetera calidioribus terris oriri sucta, patiens frugum, faccundum." Yet Stow says that the Emperor Probus, who lived towards the end of the third century, "permitted the Brytains and others that they might have vines and make wine." Nearly forty vineyards are recorded in Domesday Book as existing in the south and east of England, and every abbey or monastery of any importance in the southern half of the country seems to have had its vineyard in the Middle Ages. Holborn, Westminster, and Vine Street, Piccadilly, were sites of old vineyards and wine-presses; though the best grapes and the best wine seem to have been produced in Herefordshire, Shropshire, Gloucestershire and Worcestershire. Of course all these vineyards were in the open air, the vines being

"held up with poles and frames of wood, and by that means it spreadeth all about and climbeth aloft; it joyneth itself unto trees, or whatsoever standeth next unto it." It is to be feared, however, that, though very fair wine may now as formerly be made from grapes grown in the open air in this country, the fact that better wines can more easily be produced across a few miles of sea will effectually prevent any considerable revival of the English vineyard. The decorative value of the grape-vine is so great, that one can but regret this destiny.

Few climbing plants surpass in beauty the various species of vine which are found wild in Asia and North America.

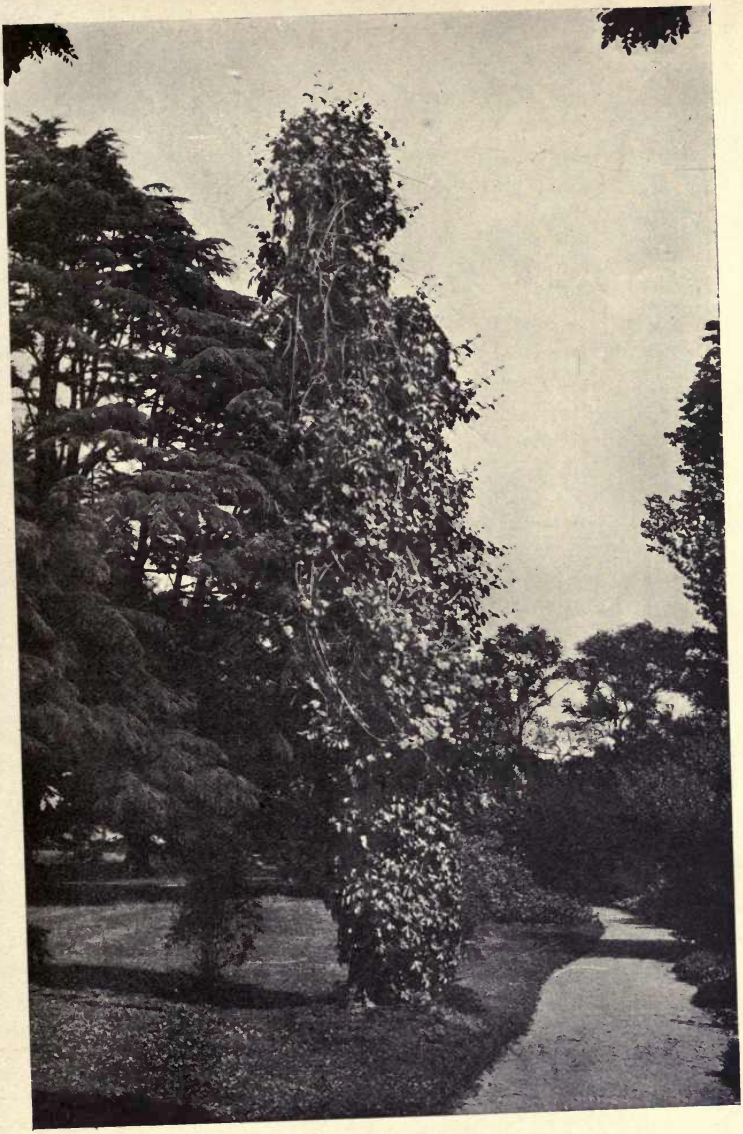
In a "Catalogue of Plants" by a "Society of Gardeners," issued in 1730, the list of decorative vines then grown is as follows:—The Parsley-Leaved Vine, the Wild Virginia Vine, the Fox Grape, the Blotched-Leaved Vine, the Strip'd-Leaved Vine. "These sorts being cultivated by the curious in botany, we thought proper to add in this place. The several sorts cultivated in the vineyards, etc., we shall refer to a proper work, and by leave to add another plant in this place which, although not strictly agreeing with the others in all its characters, yet being nearly allied to them, and for want of a better place, may do well enough in this—the Virgin Vine or Common Creeper." We seem to have lost the striped-leaved variety, but our gardens now contain several additional species of great and individual beauty. Still few surpass the common grape-vine (Vitis vinifera) and its varieties, Apiifolia (the Parsley-Leaved Vine) with delicately and deeply-cut foliage, and Purpurea, with its leaves coloured deep purple all through the summer and autumn, when they are allowed to ramble at will over arches, trellises, or out-buildings. A vine which has been grown in English

VITIS DAVIDIANA

gardens since the middle of the seventeenth century is the North American V. aestivalis, or Summer Grape, which is, like most of the vines, graceful and pleasant, and in some autumns takes on a brilliant red colour. Another old species introduced into this country two hundred years ago is the Tree Vine (V. arborea), with beautiful deeply divided foliage. This species is seen to best advantage when grown as a sprawler, as it is somewhat bushy in habit. One of the best and most vigorous of the American species is the Northern Fox Grape (V. Labrusca), the leaves of which, however, usually fail to colour in autumn. None of the true American grape-vines take on so rich an autumn tint as some of the varieties of Ampelopsis—now classed among the vines—though the strong-growing V. Californica is a near rival in that respect. But even the old Virginian Creeper is surpassed by the well-known Asiatic species, Ampelopsis Veitchi, which has become so generally cultivated in this country for the beautiful and very varied forms of its leaves, for its hardihood aud vigour, for the richness of its autumn colours, and for its useful habit of clinging to the surface of wall or building. Of the true Asiatic vines — apart from the varieties of V. vinifera—the one most frequently grown in England is probably the Hop-Leaved Vine, which often has, especially if grown against a wall, quite a crop of little blue grapes, is very beautiful in habit, and possesses delightful foliage. But supreme among the decorative vines is the vigorous, large-leaved Japanese species, V. Coignetiae, which in its native home clambers over the tops of the tallest trees. Through the summer the large green leaves have their under surface clothed with fawn-coloured down; but it is in the autumn that the plant is most glorious, for then its foliage assumes every shade of crimson, orange, rose, yellow and scarlet.

The pleasure to be derived from the vines is increased

by the delicious fragrance which many of them (in particular V. riparia, a hardy American kind) yield especially when in bloom. Indeed, Bacon referred to the scent of the flowers of the vine as among the sweetest in the garden. Most of the vines can be easily grown in any garden if the soil be deeply dug, well enriched with rotten manure, and kept moist, yet not water-logged. They are readily increased by means of cuttings or eyes, though V. Coignetiae is an exception in this respect, and is best raised from imported seeds.



VITIS THUNBERGIANA

THE CULTIVATION OF THE GRAPE-VINE

THE VINE

(*Vitis vinifera*)

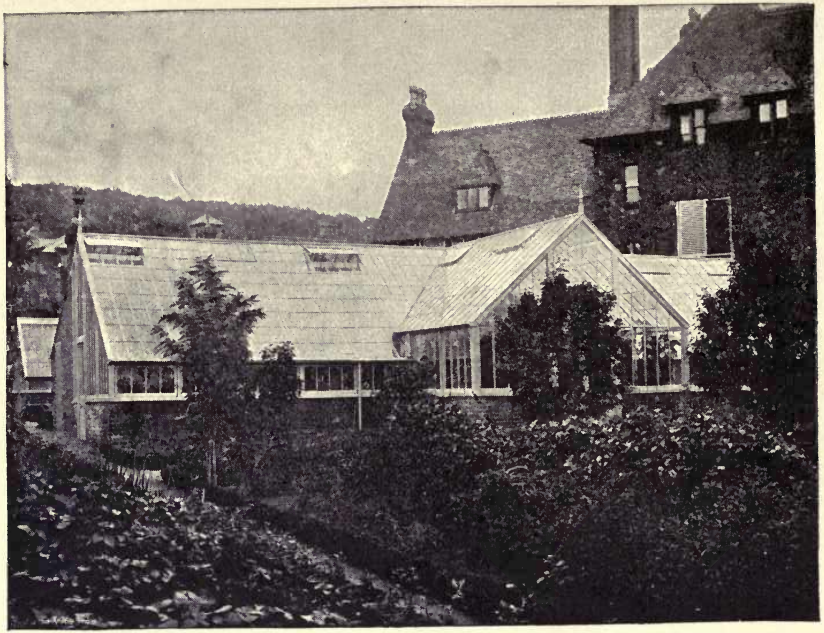
The vine has commanded the attention of man in a greater or less degree from the earliest period of the world's history up to the present time. According to Sickler, its cultivation extended from Asia to Egypt, and thence to the southern parts of Europe through Greece. From Italy it is said to have progressed northwards into France, and probably it was introduced into Britain by the Romans. The vine is by no means difficult to grow, and under favourable conditions as regards soil, situation, and climate it lives to a great age, and continues to yield satisfactory crops year after year. Pliny mentions a vine six hundred years old. The now historic vine at Hampton Court Palace was planted one hundred and thirty-two years ago, and still annually yields a large number of useful bunches. Of course the bunches and berries produced by this celebrated vine are, in point of size and quality, much below those produced by younger and more vigorous vines. When grape vines exhibit unmistakable signs of exhaustion through age, it is much better to root them out as soon as the crop has been taken and to replace them the same week (assuming that the crop has been cleared at any time

between the months of June and November) by young vines, a section of the old border to the width of about three feet being removed and replaced by fresh compost for their reception, these operations being carried out in the manner recommended in this work under the headings of "When and how to make vine borders," and "When and how to plant vines." The vines may be allowed to bear a few bunches in the first or second year after planting, according to the time at which the vines were planted. This I have frequently practised during the twenty-five years I was head gardener at Longford Castle, Salisbury; indeed, on more than one occasion, bunches cut from vines planted at the end of June in the previous year were included in my prize exhibits at the Crystal Palace and other autumn fruit shows. I mention these facts merely to illustrate what may be done in the way of "express" grape growing, and also to show how easily managed, highly accommodating and remunerative a plant the vine is.

There are a great many varieties of the grape-vine in cultivation under glass in some gardens. I grew as many as twenty varieties in the several vineries in Longford Castle Gardens while there, but the enumeration of all these varieties here is unnecessary. I shall therefore confine my list to the mention of only the best varieties which find favour in leading grape-growing establishments.

Form and Dimensions of the Vinery

The shape and size of the vinery should be determined by circumstances. They may vary as much as the perception and financial means of the individual owners do and yet be capable of yielding first-rate grapes. The plain and cheap, but nevertheless substantial structure will,



EARLY AND LATE VINERIES WITH PLANT HOUSE IN CENTRE

under the same conditions, yield crops of grapes as good and satisfactory in every way as will the more expensive ornamentally constructed vinery. But where wall space having an aspect facing due south or south-west is available, there is no more suitable description of vinery for the production of early grapes—that is, grapes to be ripe in May—than that known as a "lean-to." Of course, grapes to be ripe during the months of June, July, August, September and October may be and are successfully grown in "lean-to" houses.

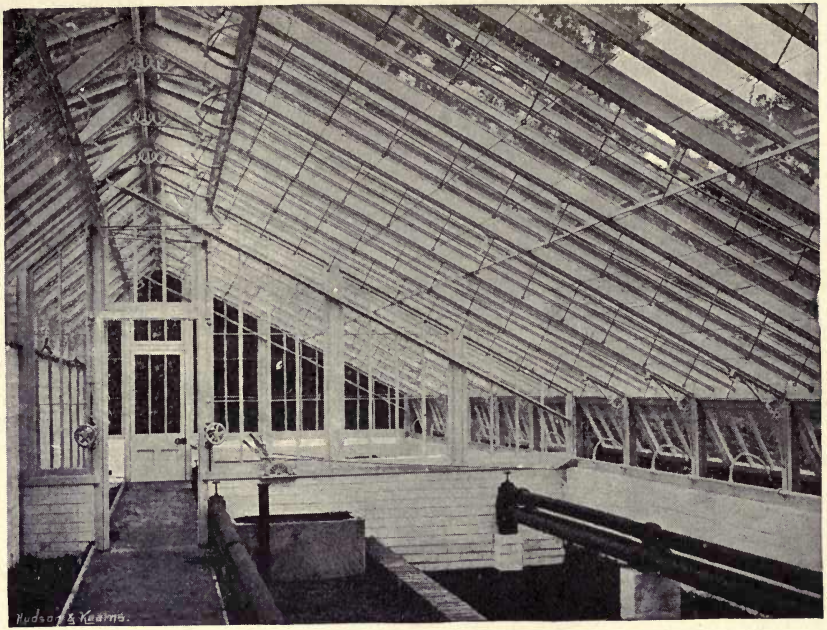
The next best shape of vinery for walled-in gardens is that known as the "hip-roof," or "three-quarter span. This form of vinery affords more light to the interior through the back roof than would be obtained in the case of a "lean-to" house.

In both, front ventilation may be admitted through continuous front glass lights worked by machinery, or the front ventilation may be effected by a series of boxes built in the front brickwork, and regulated by either sliding or hanging shutters. The top ventilators should open the full length of roof by machinery. Another house is that known as the span-roofed vinery. This should run north and south, so as to admit of the vines having the full benefit of the sun throughout the day. The span is invariably used for the production of fruit, both early and late in the season, where no wall-space is at hand for the lean-to or three-quarter span. The span-roofed vinery has much to commend it to those interested in the production of all kinds of fruit and plants, not only on the score of economy, but also on account of the advantages which it affords from a cultural and productive point of view.

Construction of the Vinery

If the site on which it is proposed to erect vineries is near the highest known water-line in that particular part, and there is no choice of sites, it will be necessary to allow for this closeness to the natural water level in constructing the vinery by having one or more steps, according to circumstances, leading up to the house from the ground-line outside, so as to allow of the base of the border being made above the ascertained water-level, thereby preventing the possibility of the vine roots being submerged at any time.

Where it can be done, a good sized forcing house, liberally supplied with hot-water pipes, should be erected in preference to low, narrow, and consequently short-raftered structures, which means short-rodded vines and fewer bunches of grapes. Therefore, a lean-to vinery should be about sixteen feet wide inside between the front and back walls, the latter being, say, fifteen feet high, and the height of the front sashes from one and a half feet to two feet, the length being anything between thirty and two hundred feet, according to circumstances. A house of this size will afford a roof angle of about thirty-five degrees to sun and give a length of rafter of nearly twenty feet. Such a house affords ample scope to the vines to extend sufficient growth to maintain them in a vigorous, healthy condition. Instead of constructing the vinery of sashes resting on heavy rafters, light rafters, one and a half inches by three inches, should be employed, these being strengthened by and nailed to purlines amid rafters and supported vertically by lengths of gas tubing one and a half inches in diameter (outside measurement), resting on brick piers at intervals of ten feet, and having a Y-shaped piece, quarter inch by one inch, of iron inserted in the top to grip the



RANGE OF THREE-QUARTER SPAN EARLY AND LATE VINERIES

purlines, which should be two and a half inches by three and a half inches, and bevelled to admit of the rafters resting properly thereon when nailed to them. Other items of wood necessary to the erection of a house of this description are as follows:—Wall and end-plates, four inches by five inches; end-rafters, three inches by four inches; end and division bars, one and a half inches by three inches; a piece of wood, to be nailed to the top end of rafters, one and a half inches by three inches, rabbeted in a line with the bed of rafters for the top squares of glass to rest on, this being capped by a piece of wood two inches by two inches, with the two upper angles slightly rounded for securing the water-tight hinges of ventilators to when fastened longitudinally on the upper surface of the rafters immediately under the coping; drip, one inch by three inches; door frames, three inches by four inches (the lintel being bevelled to prevent water lodging thereon), with oaken sills of the same size; doors, six feet six inches by two feet eight inches, the doors being either all wood, or made of one half glass, as may be desired, and hung on substantial brass butts and provided with brass mortice lock and suitable furniture. The woodwork should receive two coats of good white-lead paint before being fixed and one more afterwards. Each house should be provided with a liberal supply of roof ventilators, these being hung in the manner indicated above at intervals of about four bays and worked throughout by continuous gear, having *curvilinear* lifting and lowering rods. The roof should be glazed with glass twenty-one ounces to the square foot, using panes eighteen inches wide and twenty-two inches long, these being bedded in best white-lead putty and sprigged on top, putting four brass spriggs to each pane. In glazing, leave out the top panes in every fifth and sixth pair of rafters for the ventilators to cover when glazed

with two squares same size glass, a transom, one and a half inches by three inches, being cut to fit in between and flush with both the upper and lower surfaces of the rafters, so as to enable the ventilators to shut down quite close on them.

The brickwork prepared in readiness for the erection of the structure which is now, so to speak, ready for fixing, should be—back wall, fifteen feet by fourteen inches; front wall, three feet by nine inches, the latter being built on arches, in order to afford the roots free access to the outside border. Of course this only applies to vineries having prepared borders inside and out, with the vines planted in the inside border, both walls being built on concrete footings.

In constructing a span-roofed house, of course, a ridge one and a half inches by seven inches will be necessary (this being grooved in a line with the bed of the rafters to receive the top square of glass); capping, one inch by five inches, and an additional purline placed as recommended above. The width of spans, like "lean-tos" and "three-quarter spans," varies according to the requirements, as well as to the fancies and means of garden proprietors. However, a suitable size may be found in an erection twenty feet wide inside the walls, with front ventilating sashes two feet deep and about three feet wide, so as to correspond with the width of the two bays immediately above them in the roof; the rafters being fifteen feet long, the lower plate resting on a nine-inch wall, rising one foot above the floor-line of the house. This will give a clear space of thirteen feet between pathway and bottom of ridge, and an angle of about fifty degrees to the sun. A span ten feet wider, with twenty feet rafters, will afford a clear space of over seventeen feet between ridge and floor-line, and give an angle of about forty-five degrees to the sun. Span-houses, as a matter of course, should be provided

with two sets of roof ventilators, these being hung from the ridge, on either side, at intervals of four or five bays, the ventilators on one side being fixed angle-wise to those on the other side, water-tight hinges being used for the purpose.

On Heating Vineries

To begin at the beginning, where any extent of four inch pipes—say, from five hundred feet upwards—is to be heated, the horizontal tubular boiler is to be recommended, sizes being supplied to meet special requirements in the matter of heating, as under :—

No. 1. Nine pipes on top, three pipes at side, four feet six inches long; heating power in four-inch pipes, 750 feet.
No. 1. Nine pipes on top, three pipes at side, six feet six inches long; heating power in four-inch pipes, 1250 feet.
No. 1. Nine pipes on top, three pipes at side, nine feet six inches long; heating power in four-inch pipes, 1750 feet.
No. 2. Eleven pipes on top, three pipes at side, four feet six inches long; heating power in four-inch pipes, 1250 feet.
No. 2. Eleven pipes on top, three pipes at side, six feet six inches long; heating power in four-inch pipes, 1750 feet.
No. 2. Eleven pipes on top, three pipes at side, nine feet six inches long; heating power in four-inch pipes, 2250 feet.
No. 2*b* pattern. Eleven pipes on top, three pipes at side, nine feet six inches long; heating power in four-inch pipes, 4000 feet.

The tubes in the No. 2*b* pattern boiler, at sides and over fire, are four inches inside in diameter, while those in the other six boilers mentioned are three inches inside in diameter. It is important in setting boilers in position on a bed of brickwork or concrete, that a proper rise from front of furnace to back should be allowed, in order to secure a good free circulation of hot water from the boiler to the flow pipes, in which also a rise of from half an inch to three-quarters of an inch should be allowed in each nine feet length of pipe. Thus a rise of two and a half inches should

be allowed in fixing the bed for the four feet six inch boiler; three and a half inch for the six feet six inch size; and five inches for the nine feet six inch boiler.

The tubular boilers—according to my experience of them—will last a life-time, and that a long life too. In saying this I have in my mind's eye two or three tubulars which at the present time are apparently as good, and do their work as efficiently, as when placed in position forty years ago. In the case of small houses, there are various shapes and sizes of Saddle boilers to choose from.

In heating forcing-houses it is good policy to provide them liberally with four-inch pipes. It is much better to obtain the necessary degree of heat in a house by means of a greater number of pipes moderately heated than by the use of fewer highly heated. Of course this would increase the initial cost of the heating apparatus, but it would be more than compensated for by the economy in fuel, in heating the pipes moderately rather than to a maximum degree in order to get up and maintain the desired temperature. Moreover, the degree of heat thus acquired is necessarily more genial and less arid than that afforded by highly heated pipes, in addition to which the heating apparatus is subjected to less strain in doing the work required of it.

Either socketed pipes with joints made of a few rounds of yarn and cement to finish off with, or plain-end pipes connected by indiarubber joints may be used. Both are effective and easily made joints; the indiarubber joints, if a little more expensive, are more easily made and quite as easy to take apart as put together, which circumstance is an advantage worthy of consideration by those about to heat their houses by means of hot water.

A lean-to vinery sixteen feet wide and having a rafter nineteen feet in length, should, if used to produce ripe grapes by the end of April, have three flow four-inch pipes in front, and two returns running alongside the

pathway about three and a half or four feet from the back wall. A span, twenty feet wide with fifteen feet rafters, should have two four-inch flows on each side suspended by substantial hooks, attached to and gripping wall plates, and one return on either side of the central pathway.

Trellises for Vines

Trellises for training vines should be fixed longitudinally not less than fifteen inches from the glass at intervals of from ten to twelve inches. A cheap, simple and most efficient trellis may be made as follows:— Fix a piece of one and a quarter inch gas tubing corresponding with the length of rafter to mullion and door-post at, say, fifteen inches from the roof glass, with bolts a quarter of an inch thick, tightening these up on the outside by means of nuts, one small plate of iron being placed between each of these and the wood to prevent the nuts cutting into the latter when screwed home, as well as to afford additional strength and durability to the work when completed. This done, place three vertical bars of one inch by quarter inch iron at equal distances from the junction of front with end wall-plates to the doorpost, the irons being twisted, crunked about two and a half inches at top, and flattened out a little at each end to admit of them being secured to wall-plate and end rafter with large wooden screws, two screws at each end. The quarter inch edge of irons should rest perpendicularly against the tubings, thereby enabling them to withstand the great strain necessarily incurred in tightening the individual wires, which should consist of No. 14 (galvanised). Having marked the position which each of the wires is to occupy—ten to twelve inches apart—on the tubings with a piece of chalk, take the end of each wire once round the tubing, and twist it three or four times

round one of the wires which are to form the trellis. The wires should be cut about twelve inches longer than the house to enable the ends to be taken through the central eye and round the wheel in each radisseur, connected to the tubing at the other end of the house by a couple of rounds of the same sized wire, and then tightened with the key to the desired degree of tightness. This done, insert a series of small screw-eyes at twenty inches or twenty-four inches apart, as the case may be, in each rafter immediately above each line of wire, the screw-eyes in each successive rafter being placed angle-wise to those in the preceding one, so that the weight of crop may be distributed equally over the whole trellis and roof of the vinery when the latter is connected with the individual screw-eyes by means of short lengths of wire of the same gauge with hooks formed at right angles at each end. These are to be closed in with a pair of pincers when attached to the wires and screw-eyes, thereby completing a most efficient "hinge"-trellis, which, in many ways, is preferable to the usual stiffly fixed ones.

In the case of a span-roof vinery, I need hardly say that the trellis described above should be fixed under both roofs in the manner indicated, the top wire being fixed immediately under the apex at the proper distance from the roof glass. The top ends of both sets of tubing should be flattened out a little, and then bolted together through the central upright division bar between lintel and ridge, the bolt being secured on the outside by a nut, and a plate, quarter inch by one inch, and sufficiently long to extend a couple of inches over lintel and end of ridge, having been first placed over the bolt between the nut and woodwork. This plate, being provided with four counter-sunk screw-holes to admit of its being screwed to ridge and lintel, will afford sufficient support to the tubing to resist the strain necessarily involved in tightening the top two or three

wires. The whole trellis should receive three coats of good white-lead paint as soon as finished, or at least before the vines and lateral growths are trained thereto.

Ventilation

Upon the manner in which fresh air is admitted to forcing and other glass-houses in which plants are cultivated depends in a great measure the success or otherwise which may be achieved by the cultivator. It must be borne in mind that fresh air should be admitted to the individual glass-houses to prevent the temperature from rising above the desired degree of heat, and not, as is sometimes the case, to lower it; bearing in mind also that a superabundance of fresh air being admitted at one time will not make up for a deficiency of this essential element to good health at another time. On the contrary, the quantity of air given in the early part of the day should be increased and decreased in accordance with the rise and fall of the internal temperature until closing time in the afternoon arrives. Plenty of moisture should be distributed in the forcing-house, in order to promote and maintain a clean, healthy, rapid growth in the vines, the judicious circulation of fresh air during the heat of the day tending to induce a short-jointed, consolidated growth, instead of the long-jointed, sappy growth which invariably results when vines are grown in a close atmosphere surcharged with moisture. In the case of late grapes, it is a good plan to open the top and front ventilators at about eight P.M. sufficiently to admit of a gentle circulation of fresh air among the foliage of the vines during the night, as no plant will flourish in a stagnant atmosphere; closing the ventilators at six o'clock in the following morning prior to distributing water over the surface of the vine border and pathway. Keep the

vinery close until the thermometer registers from seventy-five degrees to eighty degrees, at which point the top ventilators should be slightly opened, afterwards increasing the amount of air thus given as the temperature continues to rise (opening the front vents a little at the same time) until by noon the ventilators, front and top, may be opened to their full extent. It may also be necessary to open the doors in very hot weather with a view to preventing the temperature in the several vineries rising above ninety degrees. But should the thermometer register even one hundred degrees in these circumstances, it does not matter in the least so long as the vines are moist at the roots and moisture is distributed in the vineries twice before closing in the afternoon—say at eleven and one o'clock—in order to counteract the drying influence of the sun and to promote a genial atmosphere. From the time the grapes come into flower until they have "set" or formed into berries, a drier and more airy atmosphere should be observed, and, from the time the berries begin to colour until the bunches are cut, a free circulation of air should be admitted day and night. However, during the period of growth, from the time that the leaves are being developed until the grapes begin to colour, draughts must be guarded against, as a current of cold air coming in contact with the young leaves and berries might produce undesirable results. During these stages of growth, the front ventilators should be used with great care and judgment when the wind is cold; in fact, in these circumstances, all the fresh air that is necessary can be admitted through the roof ventilators. In the case of an early vinery in which grapes are to be ripe in April, a strip of tiffany secured inside the vinery to the plates and end mullions immediately in front of the front ventilators will admit of as much fresh air reaching the interior of the house as is needful for the welfare of

the vines, and at the same time obviate the risk of a current of cold air finding its way to the vines.

Suitable Composts for Vines

The grape-vine is not so particular as to soil as many people assume it to be. That the grape-vine, planted in a deep calcareous loamy soil, will flourish and produce abundant crops of first-rate grapes year after year, without being subjected to any preparation in the way of manuring and trenching of the ground prior to planting, I know to be a fact.

It is also equally true that good results in the way of crops can be obtained from vines planted in ordinary garden or field soil, enriched in the process of digging or trenching with a good dressing of short stable manure. Of course it is undesirable that the roots of the vines should be submerged during the late autumn, winter and spring months, or, indeed, at any time, although it would not matter much during the summer months. As a matter of fact, experience goes to show that heretofore much useless expense has been incurred in the making of vine borders and the preparation of composts to place therein.

However, where the natural soil is either too light or too heavy in texture for the production of good grapes, vine borders consisting of prepared soils must necessarily be made. The most suitable soil for the purpose is the top three inches of a down which has been grazed by sheep and which rests on a chalky or limestone sub-soil; and if this be cut and stacked a few months previous to being used, all the better. This may be used either by itself or with additions of old lime-rubble, wood-ashes, and horse-droppings, at the rate of one cart-load of each to five loads of the loam and one barrowful of soot, and if four hundredweights of crushed bones be added

to the above mixture, all the better. The turfy loam should be broken up with a spade or digging fork, and the whole mixed well together before being wheeled on to the excavated border which, in the meantime, has been prepared.

Making the Border

Unless the subsoil or substratum consist of limestone or chalk, it will be advisable to bottom the border with from four to six inches of concrete or chalk well pounded, so as to prevent the roots of the vines from pushing into a wet, poor, cold, uncongenial subsoil, and at the same time to confine the roots in the prepared soil. With regard to the depth and width of a border necessary to the production of heavy crops of first-rate grapes, I satisfied myself many years ago by practical experience that a border about ten feet wide and two feet three inches deep, immediately inside or outside the front wall, as the case may be, sloping down to a depth of eighteen inches at the southern limits of the border, defined by a nine-inch retaining wall, is amply sufficient. The depths given above include four inches of brickbats or clinkers, broken somewhat fine for drainage. Stones with a little gravel put on top to fill in the chinks would answer the purpose equally as well. The bottom of the border should slope at the rate of about one inch in the foot to the retaining wall, a gutter brick being imbedded in, and level with, the concrete or chalk surface, covered by another placed upside down, and connected with a drain, as a means of carrying away any superfluous water that might otherwise accumulate about the roots of the vines at an undesirable time of year. The drainage should be covered with turves a couple of inches thick, one foot wide, and from two to three feet long,

grassy side down. This will prevent the soil from getting into and choking the drainage. A border of the depth and width indicated above, well filled with fibry roots, is far preferable to a border of twice the width and depth given and but sparsely furnished with roots, as experience teaches us that such borders invariably are. What the cultivator should aim at in the initial stage of grape-growing is to secure a network of roots in his vine borders and then to feed them well by giving frequent good surface dressings of some approved artificial manure, such, for instance, as Peruvian guano, during the period the vines are swelling their crops; laying on the artificial immediately before applying water, so that its virtues may be washed down to the roots as soon as possible. This very desirable state of things is sure to be attained by making the borders as recommended above. The same slope to the south being given to the surface of the border as advised for the base will enable the soil to derive full benefit from the sun's rays—the sun-warmed surface attracting the roots thither into the three or four inches of short manure which should be laid on all front borders in the autumn and renewed in the spring as a "mulch" or surface dressing.

In the case of "lean-to" and "hip-roofed" vineries I should prefer planting the vines in a strip of border formed inside the house and extending about two feet from the front wall, this being enclosed by a four and a half inch brick wall, nine-inch piers being built into this at intervals of nine feet for supporting the hot-water pipes. The roots will speedily extend to the outside border between the arches provided for the purpose, and on which the front is built.

In the case of span vineries, I have in my mind's eye vineyards where there are several ranges of vineries erected side by side on the pier system—that is, where half the rafters of each successive pair of houses spring

from the same pier-supported plank, and in which houses the same atmospheric temperature prevails throughout. The glass-covered space in each house was simply dug or trenched from eighteen inches to twenty-four inches deep, liberal dressings of short manure being incorporated with the soil in the process. Into this, in some cases pebbly, soil the vines were planted, and heavier crops of fine grapes (including Muscat of Alexandria) I never saw on vines growing in the most elaborately made borders. With such evidence as this before my eyes, is it any wonder that in this work I hesitate to advocate an unnecessary expenditure in the making of vine borders except in the case of unsuitable soil or nearness to water? Heretofore many people were deterred from attempting to grow their own grapes by reason of the expenditure which the formation and composition of the vine border on the lines recommended at the time, as being indispensable to the production of even moderate grapes, would incur. A perusal of this work will, I trust, remove this very erroneous impression, and at the same time show how very easy and simple a subject the grape vine is to manage. Should it be found necessary to bottom the border inside a span vinery when the roots are confined therein, the base of such border should slope slightly from both sides to the middle, where the gutter-bricks should be placed as described above.

Where new borders are necessary, they should be made in sections to begin with. In the case of a "lean-to" vinery wherein the vines are planted three feet apart in the two feet wide inside border, a breadth of three feet outside will afford ample scope for the roots for the first year, keeping the soil in position by means of a turf wall, completing the width of the border during the two following years. In forming the borders in a twenty feet wide span, make them in sections five feet wide each side in the first year, completing the

work during the two following years in sections two and a half feet wide each. In the case of a thirty feet wide span the completion of the borders might extend over a period of three years.

Where the natural soil is quite unsuited to the growth of the grape-vine, and at the same time it is not convenient to go to the expense of making a vine border in the manner described above, I should simply recommend the digging of a trench three feet wide outside the house, and of the same depth as indicated above, putting in drainage as recommended, and then filling in with prepared soil in which to plant the vines in due time, the vines being taken into the house by apertures made in the wall for the purpose.

Select Varieties of the Grape Vine

For yielding a supply of ripe grapes in April, May and June, the following well-known varieties should be planted. Assuming the vinery to be forty feet long, thirteen vines planted at three feet apart will be necessary, commencing at eighteen inches from the end. They should be planted as follows:—

Eight Black Hamburg.
Two Madresfield Court Black Muscat.
One Buckland Sweetwater.
Two Muscat of Alexandria.

The Muscat, being planted at the end where the hot water enters the house.

In a house of the same size, for supplying ripe grapes in July and three following months, the following order should be observed:—

Six Black Hamburg.
Three Madresfield Court.
One Muscat Hamburg.

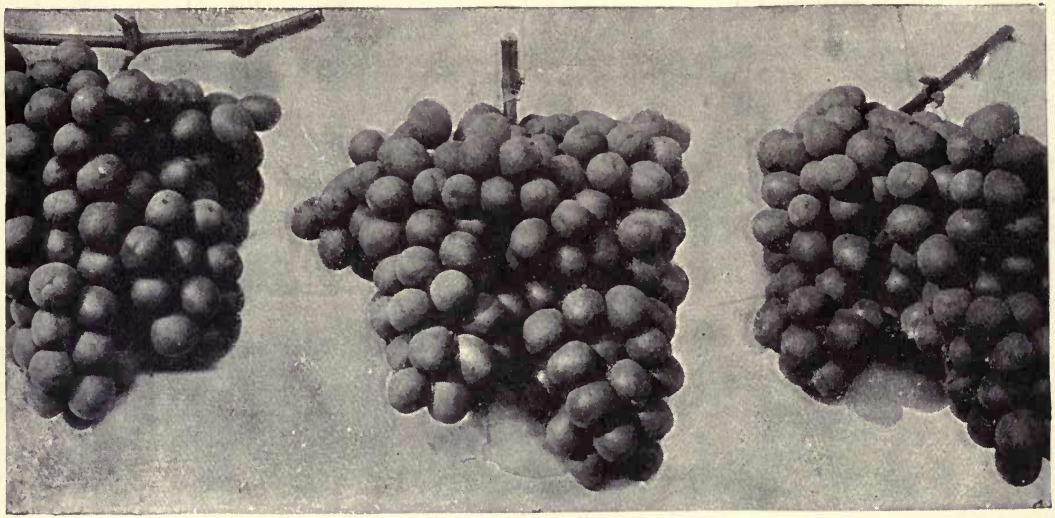
Two Muscat of Alexandria.
One Canon Hall Muscat.

For yielding ripe grapes during November and the four following months, thick-skinned and therefore long-keeping grapes should be grown, and of these the undermentioned varieties are the best:—

One Muscat of Alexandria.
One Canon Hall Muscat.
One Mrs Pearson.
One Diamond Jubilee.
One Black Alicante.
One Apley Towers.
One Gros Maroc.
One Gros Colmar.
One Gros Guillaume.
Two Mrs Pince's Black Muscat.
Two Lady Downes.

Where there is only one vinery, in which the vines are allowed pretty well their own time to push into growth toward the middle or end of March, only sufficient heat being used in the house during the winter to prevent "bedding out" and other plants from being injured by "Jack-Frost," the owner is naturally anxious to extend his supply of ripe grapes from the end of July to the middle or end of January. To enable him to do this, the following selection should be planted.

Two Black Hamburgh.
Two Madresfield Court.
Two Muscat of Alexandria.
One Mrs Pearson.
One Diamond Jubilee.
One Black Alicante.
One Gros Maroc.
One Mrs Pince's Black Muscat.
One Gros Colmar.
One Lady Downes.



EXHIBITION BUNCHES OF GRAPES (ALNWICK SEEDLING)

The grapes given in the above-mentioned lists will be fit for use pretty much in the order in which their names appear in the respective lists.

Descriptive Remarks on the Varieties Selected

A few remarks respecting the several varieties of the grape vine mentioned above will not be out of place here. Instead of taking the names alphabetically, I will refer to them in the order in which they were mentioned in the last section.

Black Hamburg is the best of all grapes for early forcing and for general purposes. It is a free grower as well as a free bearing variety, producing as a rule compact bunches ranging in weight from one and a half pounds to three and a half pounds, according to the vigour of the individual vines and the number of bunches which each is allowed to carry as a crop. A bunch of this excellent grape weighing about twenty-one and three-quarter pounds was exhibited at Belfast in 1874 by Mr Hunter, gardener to the Earl of Durham, at Lampton Castle, Durham. Berries large when well thinned, attaining to between one inch and two inches in diameter, sometimes roundish oval in shape, but generally round, and when well grown hammered in appearance—this being one of the distinguishing marks of good culture. Skin bluish-black and carrying a heavy bloom. Flesh firm, melting, and full of flavour.

Madresfield Court is a noble looking grape, the bunches, consisting of large oval-shaped berries, being handsome in appearance, broad-shouldered and tapering. The berries attain to fine size when properly thinned. Foot-stalks short and stout. Flesh firm, and excellent in flavour. It is a black Muscat, and when coloured well is quite black and covered with a dense bloom. Bunches, one pound to three and a half pounds and sometimes five pounds in

weight. This fine early as well as mid-season grape was raised by the late Mr Cox, who was many years gardener to Earl Beauchamp at Madresfield Court, Malvern. It is the result of a cross between Muscat of Alexandria and Black Morocco, and was distributed in 1868 by Messrs John and Charles Lee of Hammersmith. The wood and foliage are easily distinguished from that of other varieties, the leaves acquiring a rich crimson tint in maturing.

Buckland Sweetwater is a good early white grape. Bunches average in weight from one and a half to four and a half pounds. (The writer took off a vine the first year after striking three handsome bunches, which together weighed twelve and a half pounds, and were awarded a medal by the Fruit Committee of the Royal Horticultural Society.) The flesh is thin, juicy and pleasant to the palate when eaten at the right time. It does not improve by keeping. This, like other grapes having long foot-stalks, does not require much thinning; if compact solid bunches are aimed at, all that is necessary is to remove all the small stoneless berries; the remaining properly stoned berries will (owing to their long foot-stalks) have plenty of room to attain to large dimensions. This popular grape was raised at Buckland, near Reigate, Surrey, from seed brought from the Continent, and it was introduced into commerce by Messrs Ivery & Son of Dorking, in 1860.

Muscat of Alexandria is without doubt the finest and best grape in cultivation. It is a free grower and a reliable bearer. When well done, the broad-shouldered tapering bunches, consisting of large oval-shaped amber coloured berries, extending from fifteen inches to twenty inches in length, are everything that can be desired in a grape, solid bunches sometimes attaining to from four to six pounds in weight. The late Mr William Pratt,

when gardener to the Marquis of Bath, Longleat, Warminster, excelled in the cultivation of this grand grape. Four vines—one in each corner—filled one of three sections of the immense lantern-span roofed vinery, about two hundred and fifty feet long, thirty feet wide and of proportionate height; the vines were trained horizontally in a line with the front ventilators, rods being taken up the trellis at intervals of five feet. It took some years to get four vines to furnish the trellis in this large house with fruiting wood, but supernumeraries were planted at the same time as the four vines destined to fill the whole house, in order to yield crops of grapes during the first years, the bottom spurs as well as the vines themselves being removed as the permanent vines required more space, until the last supernumerary was discarded. In this way a full crop of grapes might be said to have been secured from the second year after planting. I have frequently seen the grapes at Longleat, and finer crops of Muscats I have never seen in any other part of the United Kingdom; in fact, I have never, taking the crop throughout, seen any Muscats to equal the Longleat Muscats, many of the bunches exceeding six and a half pounds in weight, the berries, too, being of great size and substance, and borne on unusually stout foot-stalks. The colour, bloom and flavour of the berries left nothing to be desired in this direction. It is only fair to Mr William Taylor, the late Mr Pratt's predecessor in the management of the Longleat gardens, to say that he planned and superintended the erection of the "big" vinery at Longleat, made the borders, planted the vines and grew and fruited them for some years before leaving. One of the largest as well as the oldest vines of Muscat of Alexandria in the country is that at Harewood House, Leeds. It was planted by a Mr Chapman in 1783, and has long since filled a vinery sixty feet by eighteen feet with

fruiting rods, and it is said to bear an annual crop of about three hundred bunches.

The culture of Muscat of Alexandria is better understood now than it was some twenty or thirty years ago. And, although the grape has the character of being a "shy setter," such really is not the case; neither is the very high and dry atmospheric temperature, sometimes recommended as being indispensable when the grapes are in flower in order to secure a good "set," necessary. Well-conditioned vines will set quite freely in the same atmospheric temperature as that required by Black Hamburg, and, indeed, by all other varieties of the grape, when in this interesting stage of growth. They like a somewhat dry, airy, and at the same time fairly warm temperature, with a buoyant but not arid atmosphere; the bunches when in flower being syringed very gently with tepid water at about noon on bright days, applying the syringe more sparingly on dull days, as a matter of course. Thus treated, I have found Muscats to set as freely as Black Hamburgs.

Muscat Hamburg is an oval-berried black Muscat of fairly vigorous growth and free-fruiting habit. It produces good-sized bunches, with long and rather loose shoulders, and has the reputation of being a bad "setter," and consequently the individual bunches contain a goodly number of stoneless berries, which, however, does not matter much, as the only thinning such bunches require is the cutting out of the undeveloped berries. In any case, loose-shouldered bunches do not require much, if any, thinning other than the removing of all small berries, as the foot-stalks are long, and allow the berries ample space to swell and to develop into solid compact bunches without any danger of the berries becoming wedged. It is a thin-skinned, purplish-black grape with a fine bloom, the berries being large and the flesh melting, juicy, very rich, and

of a fine Muscat flavour. This is a very old and highly appreciated grape, notwithstanding its character of having a tendency to shank. Many other grapes have a tendency to shank when over-cropped, and also when the roots are in an unhealthy condition. Shanking of the berries is not a disease; it is, on the contrary, unmistakable evidence of lack of vigour, want of healthy root and branch growth, perhaps brought about by over-cropping the individual vines. However, it will be wise to graft or inarch the Muscat Hamburg on the Black Hamburg, which is a safe stock on which to work any grape.

Canon Hall Muscat is a grand grape; big, full bunches of its large, straw-coloured, nearly round berries having a fine appearance when ripe. The skin is thin and the flesh firm, rich, and full of flavour. The vine is strong and free-growing, producing large, pale green leaves, which, like the leaves of all white grape vines, die off yellow. This grape has the character—an undeserved one, according to my experience of it—of being a bad "setter" unless subjected to a very high temperature during the flowering period, and unless the flowers be artificially impregnated. I have thirty-four vines in a span-house two hundred feet by twenty-five feet, and these I allowed to bear a few bunches each last year for the first time. The greater width of the borders on either side of the central pathway was occupied by tomato plants, some planted in the borders and others in pots and boxes for transplanting out of doors the end of May. These latter plants occupied the space immediately in front of, and partly under, the Canon Hall vines. The house was kept fairly close and moist until the tomato plants had rooted well into the soil, when plenty of air was afforded by opening the top ventilators to their full extent (there being no front ones in this house) to promote a sturdy growth in

the tomato plants and harden them off a little preparatory to putting them out in the open field, the plants requiring and receiving copious supplies of water at the roots mostly twice a day during the last fortnight they were in the house. Notwithstanding the presence of these conditions during the whole time the grapes were in flower, a capital "set" was secured, the only assistance rendered in this direction being the tapping of the rods between eleven and twelve o'clock to disperse the pollen, some days the syringe and clean water being used for the same purpose—conditions pretty well the reverse of those recommended by some authorities on the grape-vine as absolutely essential to a good set being obtained. Abundance of air was admitted to the vinery from the time that the bunches showed until the grapes were ripe and cut. The grapes, therefore, may truly be said to have been grown in a cool vinery, no heat having been turned on in the pipes since the end of March. The above-mentioned facts speak for themselves, hence my recording them here. All that is known of the origin of this grape is that it was grown at Canon Hall, Yorkshire, whence the name.

Mrs Pearson is a round, white Muscat grape. It ripens late, and keeps fresh for a long time after being cut. On this account, as well as by reason of its first-class qualities and fine Muscat flavour, it should find a place in the vineries of every establishment in which late grapes are in demand. Bunches produced by well-conditioned vines range from one and a half to three and a half pounds in weight, the berries attaining to fair size and acquiring an amber tint when quite ripe.

Mrs Pearson was raised by Mr Pearson, of Chilwell, Notts, by crossing Black Alicante with pollen obtained from Ferdinand de Lesseps, and received a First Class Certificate from the Royal Horticultural Society in 1874.

Diamond Jubilee is, as the name implies, a new grape;

VITIS COIGNETIAE

in fact, it is the latest novelty in this direction. It was raised by Messrs D. & W. Buchanan, Forth Vineyard, Kippen, by Stirling, in 1894, by fertilising Gros Colmar with pollen obtained from Gros Maroc; no wonder, therefore, that the offspring of such parentage should excite so much attention in the grape-growing world on account of the handsome appearance of both bunch and berry of the Diamond Jubilee grape. The average weight of bunches is about one and a half pounds. It is a late grape of great merit, as shown by the several First Class Certificates which were awarded to it by important horticultural societies in Scotland and England last year.

In size and form of bunch and berry Diamond Jubilee resembles that excellent summer grape Madresfield Court, setting freely, and colouring with a dense bloom. In addition to being awarded First Prize at the Great Shrewsbury Fruit Show last August in the class provided for new grapes, it also obtained a First Class Certificate. The fine appearance of the bunch, consisting of large oval-shaped berries beautifully coloured and carrying a dense bloom, attracted a good deal of attention on the part of the general public, but more especially did it command the special attention of the expert grape-growers present. The flavour as a matter of course in the case of a new grape was tested and pronounced as being very good for the time of year. Naturally one does not expect to find the flavour in late grapes, eaten in August, anything like so good as it would two or three months later. Diamond Jubilee is being distributed this spring by the raisers.

Black Alicante is a very popular and showy late grape; and this is not to be wondered at, seeing that the bunches, consisting of large oval-shaped berries, range from two to seven pounds in weight, these being very compact and broad-shouldered and sometimes tapering regularly

to a point. The grapes are quite black and covered with a heavy bluish bloom, the flesh pulpy and adhering slightly to the skin, and the flavour brisk and pleasant when well ripened. The bunches set very closely and well, whether grown in a cool or heated vinery, and require to be severely thinned forthwith—as is always imperative in the case of grapes having short stout foot-stalks. A peculiarity of Alicante is that the bunches frequently cover the shoots from which they spring. The grape is, as the name implies, of Spanish origin, and its popularity is due to the fact that Mr Meredith, when at the Garston Vineyard, Liverpool, cultivated Alicante extensively and well—a fact which led to its being called Meredith's Alicante for many years after that skilled grower ceased to grow grapes.

Appley Towers was raised by Mr Myles a few years ago at Appley Towers, Ryde. The vine is a good grower and a fairly free fruiter. The bunches are of medium size, even, and tapering; the berries of good size when well thinned, ovate in shape, and colouring beautifully, being intensely black and covered with a heavy bloom. The flesh is firm and the flavour brisk and pleasant. It is a good autumn grape, and was awarded a First Class Certificate by the Royal Horticultural Society.

Gros Maroc is a good autumn grape, and is very popular as an exhibition and market grape on account of its fine appearance, the bunches being compact, ranging from one and a half to three and a half pounds, sometimes when specially well done attaining to four pounds. Berries large, ovate in form, purplish black, and carrying a dense bloom. Flesh solid, juicy, brisk and of pleasant flavour. The quality of this grape is greatly improved by grafting or enarching on the black Hamburg stock. It is a very strong grower, the lateral growths being thick, short-jointed and very stiff and brittle (like Alicante and

Gros Colmar) in the young sappy state, great care being therefore required in tying the shoots down to the trellis while in this stage of growth. When they become "woody," they can be brought down to the wires with safety. It was introduced into England by the late Mr Rivers on behalf of M. Vibert of Angers, in 1855. However, the grape remained in obscurity until about 1880, when public attention was directed to its existence owing to the fact of Mr T. F. Rivers having obtained for it a First Class Certificate from the Fruit Committee of the Royal Horticultural Society, since which time it has been extensively grown. It is of very easy culture.

Gros Colmar (syn. Gros Colman) is the largest berried black grape in cultivation, the berries when well thinned —that is, when allowed sufficient room to develop to their full size—measuring quite one and a quarter inches in diameter, these being quite round. The skin, although described by some writers as being thick and tough, is by no means so, as is conclusively proved by the fact of the skin breaking when the berries are not sufficiently thinned to allow them to attain to ordinary dimensions, the lateral pressure causing the skin to break. When well coloured the berries acquire a degree and shade of blackness as well as a heavy coating of bloom peculiarly their own. Flesh fairly firm and flavour when at its best moderately good. Bunches, consisting generally of two large shoulders from the same single stem, vary from one and a half to four pounds each according to the strength of individual vines, and to the number of bunches left thereon for a crop. It is better to cut off the smaller shoulder of the double bunches for appearance's sake, and to leave one or two extra bunches on each vine so trimmed to make up in weight for the loss which the removal of the unsightly shoulder would cause. Bunches thus trimmed are not only benefited thereby in appearance, but they are also more

saleable than lopsided bunches. The vine is a very strong grower and free fruiter. The leaves are large, broad, leathery and downy on both upper and lower surfaces, developing a rusty appearance as the season advances. By these peculiar characteristics the vine is easily identified whether in fruit or not.

The history of this grape is rather meagre. Mr Rivers received it from Leroy of Angers. Afterwards Mr Standish cultivated it at Ascot, and showed it at South Kensington Gardens, then in the hands of the Royal Horticultural Society, in 1862, where its large berries and handsome appearance attracted a good deal of attention.

The late Mr William Thomson, when he erected the numerous ranges of span vineries at Clovenfords, by Galashiels, planted several of them with Gros Colmar for *market* purposes, and to him is due the credit of the grape being grown so extensively for market use. I well remember the heavy crops of this grape which I saw in the Clovenfords vineries in the autumn of 1885.

Gros Guillaume is remarkable as much for the size of bunch which it is capable of producing when subjected to special treatment, as it is for its handsome shape and fine appearance when seen at its best, the quality also being good. It is an excellent late black grape, and as such should not be used before Christmas or the New Year. The vine is a strong grower, making rather long-jointed wood, and the large leaves which are borne on long foot-stalks become beautifully and highly coloured in the process of maturation, being very effective and useful for garnishing purposes. When treated on the close-pruning system, it produces plenty of bunches, and the bunches which vary from two and a half to five pounds in weight colour most satisfactorily. The berries are generally round, and about the same size as those of the Black Hamburg. The skin is thin,

and the flesh firm, juicy, and, as stated above, good in quality. Although for general use the vine is best treated on the spur or close-pruning system, examples of the highest order in the way of immensely large, well-coloured bunches can only be secured by following what is known as the long-rod system—that is, by allowing a few strong lateral growths to attain to a length of two or three feet before being stopped, and afterwards pinching the sub-later growths and cutting these back at pruning time to the most prominent eye or bud irrespective of its being twenty or thirty inches from the main stem. It is about twenty years last September since I paid a visit to the champion large bunch grower of this grape, Mr Roberts (since deceased), at Charleville Forest, Tullamore, Ireland. Among the many fine specimens of different kinds of grape which I noticed in the above-mentioned vineries, was a single bunch of Gros Guillaume on the top couple of feet of the previous year's main stem growth. If I remember rightly, the bunch was twenty-eight inches long and twenty-four inches across the shoulders from point to point as tied out, and tapering regularly downwards, the berries being of good size, well coloured, and covered with a good bloom. The bunch turned the scale at nineteen pounds, two ounces. There was only *one* bunch on the vine—the bunch in question. Mr Roberts exhibited a bunch of this grape in Dublin in 1877 which was said to have weighed twenty-three pounds, five ounces.

A few months after my visit to Charleville Forest, Mr Roberts kindly sent me a few eyes of Gros Guillaume, which I inserted in three-inch pots and put in heat in January. These rooted in due time and were transferred to six-inch pots, and finally planted among a dozen or more other varieties in new borders towards the end of May. Every alternate vine being a supernumerary, it

was specially treated for fruiting the following year. One vine of Gros Guillaume thus treated ripened three bunches which together weighed thirty pounds, and were jet-black in colour.

Mrs Pince, I believe, is the only late black Muscat grape in cultivation in this country, and a truly valuable and high-class late grape it is, too. It is a strong and vigorous grower, the shoots and foliage being very distinct and easily recognised from other varieties without the bunches being present to assist in the work of identification. The under side of the wrinkled and reddish-veined leaves are covered with down; bunches large, tapering down to a fasciated point generally; berries moderately large when properly thinned, ovate, and supported by stout verrucose foot-stalks, the skin being thick, bluish-black, and carrying a dense bloom when well finished; flesh firm, rich, and full of flavour of a pronounced Muscat taste. Bunches range in weight from one and a half to five pounds each, according to the vigour of the vine and the number of bunches left for a crop. Three bunches shown on one occasion by the author at the Crystal Palace September Fruit Show weighed thirteen pounds, the heaviest bunch being five pounds, and were awarded First Prize.

There is no record of the pedigree of Mrs Pince's Black Muscat. All that is known of its history is that the seed was sown by the late Mrs Pince, then connected with the Exeter Nurseries, shortly before she died. The vine was fruited in 1863, the bunches being submitted to the Fruit Committee of the Royal Horticultural Society the same year were awarded a First Class Certificate.

Lady Downe's Seedling is a well-known round black grape of long keeping quality, the bunches and berries keeping sound and plump to the end of March, at which time the writer has more than once sent it and new

Black Hamburg to the dessert table at the same time. The vine is a robust grower and free fruiter, young vines being inclined to break or push into growth irregularly unless they are tied in a horizontal position with the ends pointing towards the ground. The leaves and leaf-stalks are downy and acquire a reddish tint before they fall in December. The bunches are frequently lopsided, extending from nine to twelve inches in length. The skin is thick, tough, and firm, the flesh being greenish in colour, thick and solid, with a somewhat sharp, but sweet, pleasant flavour when at its best.

The grape was raised by Mr Foster, gardener to Viscount Downe, of Beningborough Hall, York, in 1835, from the Black Morocco, fertilised with pollen obtained from the Sweetwater (presumably Stillward's Sweetwater). Ten years later, the fruit was first shown before the Horticultural Society, but was not put into commerce until 1853, when it was sent out by Messrs Backhouse of York.

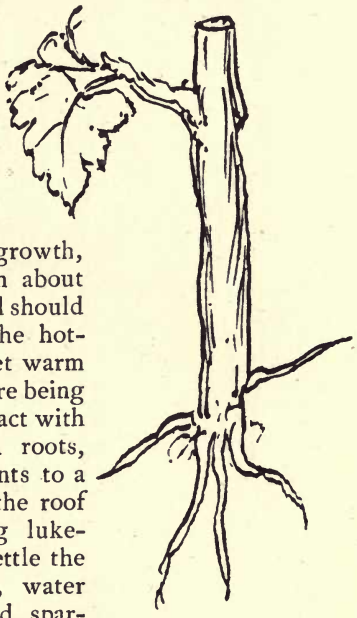
Large bunch producing varieties of the White Grape.— Mention may here be made of white varieties of the grape-vine which, under special treatment (as described under the side heading of Gros Guillaume), are capable of producing extraordinarily large bunches of grapes. These are Trebbiuna, grown and exhibited by Mr Curror, of Eskbank, Dalkeith, twenty-six pounds, four ounces; White Nice, grown and exhibited by Mr James Dickson, gardener to John Jardine, Esq., Arkleton, Langholm, Dumfriesshire, twenty-five pounds, fifteen ounces and nineteen pounds, five ounces respectively; Syrian, grown by Mr Speechly, at Welbeck, Worksop, Notts, weight nineteen pounds. The above-mentioned varieties are three good keeping white grapes of second or third rate quality and easy culture.

On Raising Young Vines

The vine is very easily propagated. The stock may be increased by layers—that is young shoots or suckers springing from the base or roots of established vines, by seed, by grafting and inarching desirable varieties on established vines, or by eyes; the latter being the most simple as well as the most efficient method of procedure to follow. This is how vines are rooted from eyes. When pruning the vines of any variety which it is intended to propagate, select the desired number of the finest and best-ripened shoots, label, tie together, and bury the ends a few inches in soil in a shady place out of doors till the beginning or middle of January, or as early after these dates as a hot-bed or suitable place in a forcing-house is available. Then take them up and cut the wood clean across with a sharp knife or pair of pruning scissors half an inch on either side of the bud or eye, afterwards taking a thin slice of wood longitudinally off the side opposite the eye. Then, having previously placed a piece of crock or cinder and a few half-rotten leaves or a little moss in the bottom of each of the necessary number of three-inch pots—that is, pots three inches in diameter inside—for drainage, and filled them to within about one inch of the rim with a light sandy mould, placing a little sand on top, press one short length of the grape vine prepared as indicated above into the centre of each pot, the "barked" side being placed flat on the sanded surface, covering with mould of the same description. Then plunge the pots to the rim in a box containing about four inches of sawdust or leaf-mould, place over the hot-water pipes or in the next best available position, giving some tepid water to settle the soil, and then

VINE EYE

cover the pots with a square of glass. This, by confining the heat and moisture about the eyes, will greatly facilitate the emission of roots and top growth—the box being sufficiently deep to allow of a couple of inches of growth being made without coming in contact with the covering of glass. When more head room is required, the glass should be raised a few inches on small flower pots, shifting the plants into six-inch pots when they have made seven or eight inches of growth, making the soil pretty firm about the roots in potting. The soil should be placed in a box over the hot-water pipes to get warm twelve hours before being brought into contact with the young warm roots, returning the plants to a position near to the roof glass, and giving luke-warm water to settle the soil. After this, water should be applied sparingly until the roots have pushed into the new soil.



ROOTED CUTTING WITH SINGLE EYE

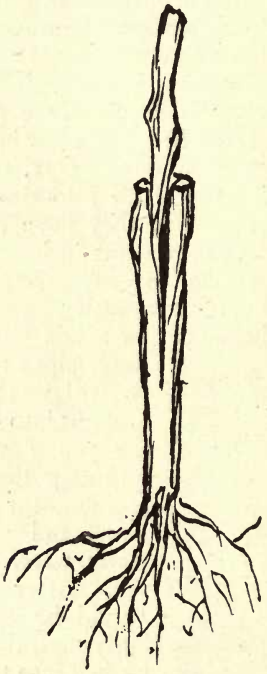
CUTTING OF GRAPE VINE

More frequent and liberal supplies at the roots will then be necessary, the plants being also syringed overhead with tepid water two or three times a day from the time they have made three or four inches of top growth, in order to encourage a clean healthy growth, and at the same time to prevent the attacks of insects, which,

conditions favouring their existence and presence, are ever ready to prey on the young tender leaves of the grape-vine.

VINE GRAFTING
THE SCION

VINE GRAFTING
THE STOCK



VINE-ROOT GRAFTED

On Planting the Vines

As soon as the young vines have made two or three feet of growth, and before the roots become matted in the pots, they should be planted in their permanent positions about one inch deeper in the soil than they

were in the pots and from three to four feet apart. If the latter distance be allowed between the permanent vines. supernumeraries might with advantage be planted between them for bearing a crop of grapes in the following year, The plants should have water given at the roots a few hours before being turned out of the pots. In planting, pass the hands lightly round the ball of earth and roots in order to rough the surface and young roots a little, thereby enabling them to push more readily and speedily into the new soil; then, having previously removed a spadeful or two of the compost forming the border at the intervals indicated, and marked off by sticks long enough to reach the first wire of the trellis, drop the individual plants into the holes thus made, pressing the soil well about the roots and afterwards watering with tepid water to settle the soil. This done, lay on a surface dressing of short manure to the thickness of two or three inches, and tie the young vines up to the sticks referred to above for support. May and June are good months for planting vines of the current year's raising in outside borders, in which case the stems are taken into the vinery through holes provided in the brickwork or wall-plate for the purpose. If cut-back vines of the previous year's raising are used, they should be planted a few weeks before growth begins—say, early in March—shaking every particle of soil off the roots, disentangling and shortening back the latter, and cutting clean away with a sharp knife any damaged portions of the fibres, spreading the roots regularly over the soil with a downward inclination southward (assuming that house and border face that direction), covering with six inches of soil and a surface-dressing of half-rotten stable manure of the thickness recommended above, and following this with sufficient water to settle the soil about the roots.

Both descriptions of vines mentioned above and planted

in the manner advised will, when treated as recommended under the heading of "Treatment in the first year after planting," make good thick rods the full length of the rafters in the same year, every one of which would be capable of ripening a fair crop of grapes in the following year if necessary. All the same, this will not be desirable where supernumerary vines have been planted as recommended above. By following this arrangement, a fair crop of grapes is secured the first year after planting without in any way interfering with the future welfare of the permanent vines, seeing that they are thus enabled to gain size and strength before there is any real occasion to crop them. Of course every grower who propagates his own vines, and, therefore, has an ample stock to hand, plants supernumeraries where a distance of four or five feet is allowed between the permanent rods.

It not unfrequently happens that vines which have been forced year after year to produce ripe grapes by the middle or end of April, or even a month later, become exhausted, or in other words, worn out. To remedy this, some growers give such vines a rest, that is, allow them to push into growth of their own accord for a couple of years in succession, cropping them lightly until they have regained sufficient vigour to be forced again; two houses planted with early bearing varieties being thus necessary to the annual production of early grapes at the dates indicated above.

Although this method of rejuvenising partly exhausted vines answers well enough, it is, nevertheless, much better to root the vines out as soon as the grapes are ripe, that is, where unmistakable symptoms of exhaustion were observed in the vines the previous year, and vines were accordingly prepared in readiness for replacing the old vines when the crop of

early grapes has been cut. The *modus operandi* is as follows:—The young vines are cut back to within two or three feet of the individual pots soon after Christmas, and stood in a cool house until the end of January, when they are taken into one of the vineries which is being then kept close and moist so as to move the vines gently into growth. The vines are turned out of the pots, every particle of soil being shaken off the roots, and the latter shortened back with a sharp knife. Thus trimmed, the plants are repotted in a compost consisting of three parts good friable loam and one of lime-rubble, horse-droppings, and small charcoal, the whole being well mixed before being used, the size of pots used being determined in a great measure by the size and strength of the several vines and the time decided upon to transplant the same into their permanent quarters. Sometimes I have potted the plants twice, at least the weaker ones, before transferring them to the borders, in which case pots eight inches in diameter inside were employed in the first instance, the plants being shifted into twelve-inch pots before the roots became matted or pot-bound, the stronger plants being potted into the last-mentioned pot at once. Each pot should have about two inches of crocks placed in the bottom for drainage, the large pieces being put in the bottom, and the smaller pieces on top; putting rough pieces of turf over these to prevent the soil from getting among and choking the drainage, the soil being rammed fairly firm about the roots in potting, afterwards watering to settle the soil. In due time, the plants push into growth, and are treated in accordance with their varying requirements in the way of watering, stopping, and so on. As soon as the grapes on the old vines are ripe the bunches are to be cut with about ten inches of wood attached, the latter being inserted in bottles nearly full of rain water, with a few small pieces of

charcoal in each to keep the water sweet, the bottles being placed in rows on shelves in the grape-room, the necks of the individual bottles resting on the edge of the shelf at an angle of about twenty degrees, the bunches hanging over clear of the side of shelf. This done, the old vines are to be rooted out, and a portion of the old border, say a strip four feet wide, excavated and replaced with new compost of the description indicated under the heading of "Composts suitable for Vines." The young vines (having had a good watering a few hours previously) are to be turned out of the pots, the ball of earth and roots being loosened round with a pointed stick so as to liberate the roots, and then planted in the manner recommended above, the soil being made extra firm about the balls in planting and water given at the roots to settle the soil about them. A surface-dressing of manure to the thickness of three inches should have been previously laid on the new soil, the young vines being trained to the wires underneath the roof glass; and in order to prevent the young vines flagging or experiencing a check in the process of transplantation the roof should be heavily shaded for a few days during strong sunshine, and the vines syringed overhead with tepid water three or four times a day. Thus treated, the vines make good growth along the entire length of the rafters and ripen before the fall of the leaf in the year of planting —becoming fully capable of producing and ripening a fair crop of grapes of high quality in the following year if necessary.

If one-year-old cut-back vines be planted at the end of March or early in April, they should be treated as recommended above—that is, the soil should be shaken off the roots, the latter shortened back a little, spread out regularly over the prepared soil with an inclination southward, covered to the depth of six inches with the

same description of soil, and "mulched" with half-rotten manure, finishing with an application of water at a temperature of 140 deg.

I am now referring to an inside border, but should the vines be planted in a new section of an outside border, a covering of fermenting material, consisting of about equal parts of stable manure and leaves, which has been thrown together a few weeks previously and turned over a couple of times during the interval, should be laid on in addition to the mulch already advised. This covering, by warming the surface of border, will promote root action earlier than would otherwise be the case, the roots pushing upwards into the slightly heated manure, to the ultimate advantage of the vines. The latter should be treated as advised for young vines, and planted out in the same year as struck. This system of covering vine borders, especially in the case of vines growing in outside borders, which are "started" at the end of November or during the three following months with a view to obtaining ripe grapes early in April and during the summer months, is an old and excellent one when carried out with intelligence and care. In the case of the early forcing of vines under the conditions indicated, the covering of fermenting material laid on the border in November and the three following months should be from eighteen to twenty-four inches deep, and be renewed several times during that interval of time by taking away some of the old and replacing with fresh fermenting dung and leaves.

On the Treatment of Vines—First Year

The vinery should be damped down well every morning and afternoon, and at about 1 P.M., in order to counteract the somewhat parching influence of strong sunshine. The vines should be syringed overhead, both morning and afternoon, and moisture should be distributed over the

floor, pathways, etc., the last damping down being done at closing time in the afternoon—the hour of taking off the air varying from 3 P.M. to 3.30 P.M. in May, and from 3.30 P.M. to 4.30 P.M. in June and the two following months—using water from a tank or tub standing in a vinery or in a sunny situation out of doors. This will cause the vines to make quick and clean growth, which if there be a free circulation of fresh air about the vines and foliage will be sturdy, short-jointed, and well-opened in due time. A little air should be admitted through the top ventilators at half-past seven o'clock in the morning, gradually increasing and decreasing the amount given as the temperature rises and falls until closing time in the afternoon. During September and the three following months, more or less top and bottom air should be left on all night, weather permitting, to assist in the maturation of the wood.

Disbudding and Stopping of the Vines.—When the vines push into growth—that is, when the buds begin to move—select the strongest at about fifteen inches from one another on each side, right and left of the main stem, the young developing shoots retained on one side of the rod being placed anglewise to those on the other. This will afford more room for the development of growth than would be the case were the shoots left opposite to each other. All other growths pushing from the main stem should be rubbed off as soon as they appear.

When the vines have extended their growth about two feet up the rafters, pinch the points out of them, and a few days later pinch the lateral growth starting from the top joint of each vine. This will cause the bud at the base of the leaf of the shoot pinched, which in the ordinary way would remain dormant until the following year, to push into growth after a lapse of ten or twelve days, the buds below, as well as the main growth,

swelling and plumping up well during the interval. Repeat the operation after the vine (leading shoot) has made a fresh growth of two feet, and so on till the middle or end of September, by which time the main growth will have reached the top of the rafters, thereby securing a uniform thickness of rod and plumpness of buds along the entire length of the individual canes, the side shoots being stopped at the first and second joints and kept pinched hard back at the latter point from the beginning.

Pruning the Vines.—When the vines have shed their leaves they may be pruned. If the canes are fairly strong and well ripened, prune them back to within six or seven feet from the bottom of the rafter, cutting weak rods back to within three or four feet of that point, and the side shoots hard back to within one inch of the main stem as indicated by the cross-cut in Fig. 8. This done, rub the loose bark off with the hands, and wash the canes with a stiffish brush and soft soapy water into which a handful of flowers of sulphur had been previously stirred.

Treatment in the Second and Subsequent Years

This begins with the pruning and washing of the vines in December or early in January; the laterals or side shoots being pruned back to the points marked by the cross-cuts in Fig. 8, the lengths the main rods shall be cut back being determined by the strength of each rod and the length of rafter to be furnished. Assuming the length of rafter to be nineteen feet, strong well-ripened canes may be cut back to within fourteen or fifteen feet of the bottom of the rafters, or they may be left eighteen feet long and be cropped accordingly. It is a waste of time and valuable space to follow the old method of establishing a house of bearing vines by simply cutting back the vines the first year after planting to within three or four feet of the

bottom of the rafter, afterwards leaving about two feet of young rod at each annual pruning time until the top of the rafter is reached. The next step to be taken in the preparation of the vines for "starting" is to rub all loose bark off the main stem and from round the spurs, being careful in doing the latter not to injure the bud to within half an inch or so of which the side-shoots have been pruned back. Then to make sure that no insect or larvæ remain on the vines, should any happen to have effected a lodgment thereon during active growth, paint them with a mixture consisting of four ounces of soft soap dissolved in a gallon of hot water, a wineglassful of petroleum being added and well agitated by drawing some of the soapy liquid into the syringe and then discharging the contents into the vessel again in order to render the petroleum soluble. While in this state add about a quarter pound each of finely sifted soot and flowers of sulphur, and sufficient clay to render the mixture of the consistency of thick paint, this being stirred occasionally in being applied to the vines by means of a stiffish paint brush. The glass, woodwork and brickwork should, however, be washed before painting the vines with the mixture, the brickwork being washed with liquid lime, and the glass and woodwork with soft soapy water, if considered necessary, finishing off with clean water applied with the syringe. This done, tie the vines together in a horizontal position immediately over the hot-water pipes close to the front wall of the house. If the vinery should happen to be span-roofed, the vines should be tied on either side, as a matter of course. Thus tied, the vines not only start into growth more regularly by reason of the check so given to the flow of sap, but they can be damped over with clean water delivered from the syringe much more quickly and thoroughly than would be the case were the vines tied up separately to their allotted

VITIS FLEXUOSA MAJOR

positions on the trellis. As soon as the buds burst into growth, the vines should be carefully untied and secured in position on the trellis.

The border should next receive attention. Rake off with a fine rake the loose surface soil from the border in which the vines are growing, then point it over slightly with a digging fork, being careful not to go deep enough to injure the network of roots near the surface, and top-dress with horse-droppings to the depth of two or three inches. Before keeping the house close and moist with a view to "starting" the vines into growth, give the whole a good watering with water at a temperature of from eighty to ninety degrees. Each successive watering will wash the virtues of the droppings down to the roots with beneficial results. In addition to this, the surface-dressing conserves the heat and moisture in the border. A fresh section of a new border may now be made, or prepared for, by first mixing up the necessary ingredients in a convenient place out of doors, and covering the mixture with some warm stable manure or fermenting leaves from the leaf-coop to the depth of from eighteen inches to twenty-four inches, so as to impart a little warmth to the compost before bringing it into contact with the young roots of the vines a few weeks later. In making the new section, make allowance for the loose soil settling down about six inches within a fortnight or so from the time of making. A similar allowance should be made in making all new borders or portions thereof.

The above-mentioned operations having been completed, the house may be kept close at night and fairly so in the daytime—providing a minimum night temperature of from forty-five to fifty degrees, according as the weather is cold or mild, should be observed, rising with sun-heat to sixty-five degrees. A moist atmosphere being secured by syringing the vines morning and

afternoon with tepid water until the buds push into growth, when the syringing of them should be discontinued: the degree of moisture necessary to produce and maintain a healthy growth being obtained by distributing water over the surface of the borders and pathways, through a rosed water-pan. As soon as the buds have enlarged a little, a night temperature of from fifty to fifty-five degrees should be aimed at, fifty-five to sixty degrees by day with fire-heat, rising to seventy degrees with sun-heat. Raise the temperature five degrees all round as soon as the buds have pushed into growth, making a further increase of five degrees in the temperature as soon as the young leaves are fairly developed and the embryo bunches show. It is most important to the promotion and preserving of a free, clean, and at the same time sturdy growth that the atmospheric conditions of the vinery should not be arid, and certainly not too humid, but something between the two and warm, moist and buoyant withal. From this point onward until the grapes are in flower, a night temperature of sixty-five to seventy degrees should be aimed at. These degrees of heat will be quite high enough to insure a good set of both Black Hamburg and Muscat grapes; indeed, these and other grapes will set very well in a temperature a few degrees lower than those given above. The lateral shoots should be stopped at one joint beyond the bunch as shown by the cross-cut in Fig. 10. Two joints beyond the bunch will be none too far to stop at, where the vines are planted at from four to five feet apart, in which case there is more trellis space for the young growths to cover without being crowded.

Setting the Grapes.—While the grapes are in the interesting stage of growth known as the flowering period, a somewhat drier atmosphere should be maintained in the house in order to secure a good "set." To aid in

this desirable object various means have been employed heretofore, and in some places are still resorted to; such, for instance, as a rabbit's tail tied on to the top of a stick three or four feet long, this light substance being passed gently over the individual bunches between eleven o'clock and noon to effect pollination—that is, the conveyance of pollen from anther to stigma. Others pass their hands gently over each bunch from top to bottom; others with the same object in view tapping the vines with the hand, or more frequently with a stick long enough to reach any portions of the rods, a shower of golden dust following each tap until the berries have set; while others attain the same end by syringing the grapes with a fine spray at the time mentioned above. The last two methods of procedure are the simplest, quickest, and most efficient means of securing a good set. Moisture, but in less quantity, should be distributed in the house during the flowering stage, especially under and between the hot-water pipes and the front and end walls in order to ward off the attacks of red-spider. Vines in a wild or cultivated state out of doors set their berries in moderately low and moist atmospheric temperatures satisfactorily enough—nature is our safest guide in the forcing of plants, fruits and vegetables—and to succeed in this direction the cultivator should first consider the conditions under which the finest examples of each have been produced naturally out of doors, and then take as his standard, in the way of soil, heat, and moisture, the most favourable known conditions under which these examples were obtained. The horticultural artist can improve not only the products of nature, but also in many instances the conditions under which the same have been found growing in their natural habitat.

Selecting and Thinning the Bunches

As soon as the bunches on the several vines have set their berries, the question as to how many bunches each vine is capable of satisfactorily ripening should be determined forthwith. Needless to say, the finest, best placed, and most evenly set bunches should be retained, these being distributed regularly along the vines. The vigour and length of each vine should be considered in deciding the number of bunches that shall constitute the crop, as well as the size of the bunches which the cultivator has the choice of retaining or removing. The size of bunch which certain varieties of the grape-vine is capable of producing should also be considered in this direction.

A fully-established and well-conditioned vine, say, nineteen feet long, of Black Hamburg, Muscat of Alexandria, Madresfield Court, Buckland Sweetwater, Mrs Pince's Black Muscat, Gros Colmar, Gros Maroc, Black Alicante, showing fairly large-framed bunches likely to turn the scale at three pounds when ripe, and to colour well at the same time, should not be allowed to carry more than eight such bunches for a crop. A greater or lesser number of bunches, according to their size and the length of the vine, may be safely retained for a crop, providing the weight of grapes does not much exceed one pound per foot in length of the vine; that is to say, does not exceed twenty-four pounds of first-rate grapes as a crop for a vine nineteen feet long from the bottom of the trellis.

In the case of "large-bunch" varieties, such as Gros Guillaume and Trebbiano, mistakes are often made in leaving more bunches for a crop than the vine can possibly ripen satisfactorily, cultivators forgetting at the right time that the larger the bunches promise to be the fewer they should be in number for the crop.

Three or four seven-pound bunches of Trebbiano are ample for one vine if its permanent vigour is considered, as it should be. One twelve-pound bunch of Gros Guillaume and two or three smaller bunches should be allowed for a crop in preference to leaving two large bunches. Trebbiano and Gros Guillaume are both extra strong growing vines, and on this account may safely be allowed to carry a greater weight of grapes for a crop than would be prudent to take from other varieties of the grape-vine. In a general way, ten or fourteen bunches of Lady Downe's, Appley Towers, Mrs Pearson, and Diamond Jubilee, weighing from one and a half to two and a half pounds (fourteen of the former and ten of the latter weight) each, may be left on each vine of the length indicated for a crop. Superfluous bunches should be removed as soon as the best bunches can safely be determined, and the berries ought to be thinned on those retained for a crop as early as possible after they have set, so as not unnecessarily to waste the forces of the vines, as is the case when the grapes are allowed to become as *large as green peas* before being thinned. The berries should be thinned out to one inch *from berry to berry* as soon as possible after they are set, retaining the crown or central berries, and being careful not to rub the bunches in any way, or to injure the berries with the scissors. In addition to a sharp-pointed pair of scissors, those engaged in the work of thinning should have a small forked birch, or other description of twig, for raising the shoulders of the bunches in the process of thinning. Loose shoulders are best cut off, as single-stemmed bunches are preferable.

Large bunches of Gros Guillaume and Trebbiano should have the shoulders tied neatly and carefully out, suspending the points with a series of ties from the trellis, care being taken to give additional support to the

points and shoulders generally as they extend in growth, otherwise the increased weight of the extremities of the bunch will cause them to assume a perpendicular position, and to cut at the point of contact with the ties.

With regard to Gros Maroc and Gros Colmar, a space of rather more than an inch (one and a half inches will be none too much) from berry to berry should be allowed in thinning; and, in thinning bunches of Buckland Sweetwater and Gros Guillaume, all that is necessary in a general way is to cut out all the small berries, as these, being furnished with long foot-stalks, will have ample room to swell out to proper dimensions. Grape-thinning, it may here be remarked, is an interesting pastime for ladies. Indeed, school children are employed to perform the work under the tuition of experts, and in some large grape-growing districts on the confines of Essex, Herts and Middlesex, gangs of women experts do the thinning in a highly satisfactory manner. As soon as the grapes have been thinned in one vineyard (consisting of from six to one hundred large houses) the women experts move on to another vineyard (of which there are several hundred) in the neighbourhood, where many quick hands, guided by keen eyes, and a thorough knowledge of the work, including the size to which certain varieties of the grape attain when properly thinned, perform their work in an expeditious and highly satisfactory manner, and once more take their departure for another vineyard, and so on, until the grape-thinning harvest is over.

Watering the Vine Borders

If the best results are to be obtained in the way of handsome, solid bunches, consisting of large, well coloured berries, copious waterings of diluted liquid manure at a temperature of from seventy-five to ninety degrees

should be given at the roots at regular intervals from the time the bunches have been thinned until the berries begin to colour, when clear water only should be applied. The waterings of liquid manure may be alternated with surface-dressings of some approved fertiliser — such as Thomson's vine manure, — this being laid on the borders immediately before applying clear water at the roots, as plants, like animals, are the better for an occasional change of diet. In watering vine or other fruit tree borders, there should be *no surface* watering, but, on the contrary, sufficient water should be given at *one time* to moisten the whole mass of soil and roots. The intervals of time that may safely be allowed to elapse between these waterings must be determined by the condition of the weather, vigour of the vines, and character of the natural or artificial soil and drainage; bearing in mind that it is difficult to overwater vine-borders well filled with hungry roots, during the summer and early autumn months, when the vines are in full growth and great absorption is going on in root and branch. And on this account the atmosphere of the vineries, as well as the soil about the roots of the vines, must be kept uniformly moist, so as to enable the vines to swell large berries, and at the same time develop large clean leaves and healthy wood growth — which an abundance of top and front air given during the heat of the summer and early autumn days will cause to be of a leathery texture, short-jointed and consolidated. Plenty of water should, as stated elsewhere in this book, be distributed in each vinery from the time that the vines have pushed into leaf until the grapes have commenced to colour, at closing time in the afternoon, when the temperature may with advantage be allowed to run up to ninety or ninety-five degrees.

During the stoning period — *i.e.* the interval that elapses between the setting and the second swelling of

the grapes—a top-dressing of slacked lime immediately before applying clear water at the roots will prove very beneficial and helpful in this direction. An occasional top-dressing of soot being laid on the border before giving clear water after the grapes have commenced the second swelling will greatly assist in the swelling of the berries and bunches to high-class dimensions. The efficacy of soot will also show itself in the dark-green foliage, which generally follows its judicious application to plants or grass-land.

As soon as the berries begin to colour, a more liberal supply of fresh air should be admitted through roof and front ventilators. This may not be possible during the heat of the day, but the quantity then given should be left on longer than usual in the afternoon, gradually extending the time of reducing the air as the colouring process advances, and increasing the amount of top and front air left on at night in proportion.

White grapes, unlike black grapes, are the better for exposure to light and sunshine from the time that the berries have commenced the second swelling—*i.e.* after the interesting process of "stoning" is completed—until they have acquired the coveted golden tint.

When black grapes commence to colour, especially in the case of Black Hamburg and Madresfield Court varieties, the pinching of lateral growths should be relaxed a little. A slight shading, such as a judicious extension of lateral growth, will afford during bright summer sunshine, will enable the berries to colour more satisfactorily than would otherwise be the case.

In the case of late grapes, plenty of light should be let in among the bunches towards the end of October or early in November by shortening back the growths to within a couple of joints of the individual bunches.

Treatment after the Grapes are Cut

The vines from which the bunches of grapes have been cut during the summer and early autumn months should be well washed morning and afternoon on bright sunny days with clean water applied by the syringe or other means, allowing abundance of air day and night, weather permitting, until they have shed their leaves, and pinching young growths at one joint as soon as they appear. This will prevent the vines' forces being unnecessarily wasted, and at the same time afford a sufficient safety-valve to the flow of sap to prevent the mature and ripening buds or eyes located at the bases of the fully developed ripening leaves from being excited into growth, the vines being also kept uniformly moist at the roots. Thus treated, the vines will be kept quite free from the attacks of red-spider, which in many instances is allowed to effect a lodgment on the vines after, if not before, the grapes have been cut—a catastrophe which will not happen under the treatment indicated above.

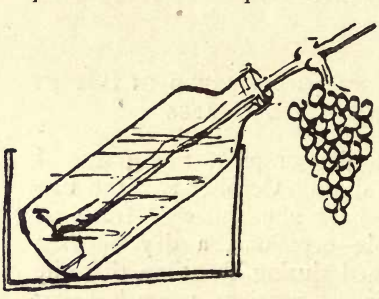
Atmospheric Conditions to be Observed in Houses containing Late Ripe Grapes

Vineries in which are hanging crops of ripe grapes of late long-keeping varieties during October and the two following months should have abundance of fresh air admitted on all favourable occasions, a dry buoyant atmosphere being maintained during the time that the grapes remain on the vines, sufficient warmth being turned on in the hot-water pipes to insure these atmospheric conditions, as well as to prevent the temperature falling below forty degrees in frosty weather, and to prevent any moisture that might otherwise arise settling on the grapes and causing the berries to damp. The

bunches should be looked over once or twice a week as long as they remain hanging on the vines, and any bad (damped) berries that might happen to be in the bunches be removed forthwith with a pair of scissors, aided by the "twig" referred to in connection with the thinning of the bunches, and by which means the berries surrounding the damaged ones can be raised to facilitate their removal without rubbing the bloom off the bunches. The removal of the bad berries will in time prevent those surrounding them from being affected. The same vigilance should be observed in this connection after the bunches have been placed in position in the grape-room, or any other place that may be made to serve as such.

The Grape-Room

The necessary number of empty bottles—champagne or other wine bottles will answer the purpose admirably—being at hand, they should be rinsed, and a few small pieces of charcoal placed in each, the bottles being then filled to the neck with rain water. This done, place the bottles pretty closely together on the shelf or shelves in the grape-room in the position shown in the figure, the edge of the shelves being sufficiently deep to insure the correct position of the bottle, say, at an angle of about twenty degrees, when the length of wood attached to each bunch is inserted. The distance that the bottles are placed from one another on the shelves must depend upon the size of the individual bunches. But



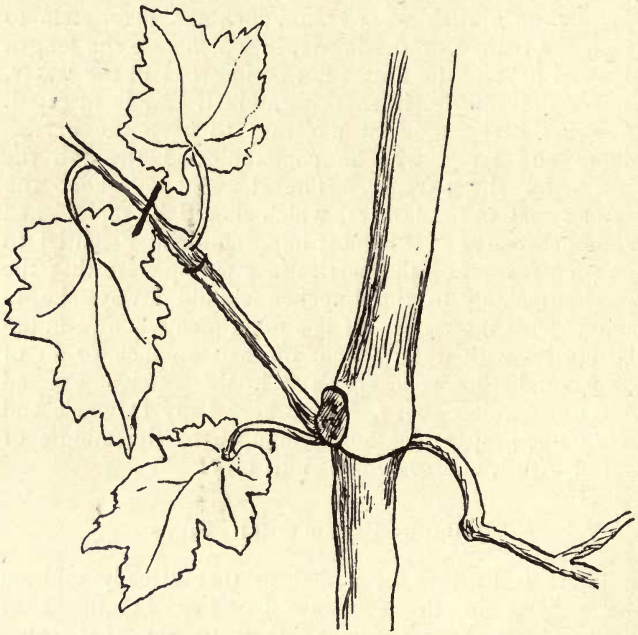
GRAPES IN BOTTLE

this can easily be regulated as the bunches are placed in the bottles. The piece of wood attached to the bunches should be long enough to reach to the bottom of the bottles, leaving a good length of wood beyond the bunch also. In the case of some bunches—Black Alicante in particular—sufficient length of wood may not be available between bunch and main stem to reach the bottom of the bottle, in which case the length of wood beyond the bunch can be inserted in the water, as it matters little, if anything, which end is inserted. In either case, sufficient moisture to keep the berries plump and fresh will be communicated through the tissues for the purpose. The charcoal will keep the water sweet in the bottles, which should be replenished when necessary, as it is most important and essential to the preservation of the berries in a plump state that the wood attaching to the bunches should always be in contact with the water. It is a good plan when re-filling the bottles with water to cut off half an inch or so of the wood before re-inserting it in the water. Treated as recommended above, I have kept Lady Downe's and Mrs Pince grapes nice and plump up to the middle or end of April, and sometimes into May.

Pruning Established Vines

There is little to be added to that already said on the subject in the section on "The Treatment of Vines—First Year," further than to say that spur-pruning is the practice generally followed. It consists in cutting the laterals hard back to within one eye of the main stem; this tends to keep the bearing shoots pretty close into the main stem, through which channel the sap flows into all lateral growths. Still, it is sound practice occasionally to prune back to a large well-developed bud irrespective of its being

one or four buds from the main rod, in order to secure extra fine bunches of any one variety of grape, cutting out any buds intervening between the bud cut back to and the one close to the main stem, the latter being allowed to push into growth and afterwards



MODE OF STOPPING LATERAL SHOOT

stopped at two or three joints, the sub-laterals being kept persistently pinched. At pruning time the short lengths of the previous year's wood selected for the above-mentioned purpose should be cut hard back to the current year's growth, which in turn should be pruned back to within one bud of its origin—selecting, at the

same time, a few more favourably placed lengths of young wood for producing good specimen bunches in the following year. By this procedure extra fine examples of the several varieties of the grape are obtained, and the vines preserved free from long gnarly spurs at the same time. Bearing this in mind, it is a good plan to encourage a few of the young shoots that frequently push from the main stems—sometimes from the base of the spurs and sometimes from the intervening portions of the main stem. These growths, being generally weak, should be allowed to make three or four joints before being stopped—cutting them close back to one bud at pruning time. In this way a due complement of young vigorous spurs can be preserved on each vine. In short, the grape-vine is one of the most accommodating and easily managed subjects we have in the way of fruit-bearing trees. The cultivator, being of an inventive turn of mind, can train and fruit it satisfactorily in various interesting and effective shapes.

Extension System of Pruning

This system includes the short-rod and long-rod methods, as well as pruning, with a view to filling vineries with bearing wood from one to four vines. The short-rod system is that already referred to; the long-rod consists in allowing one or two young rods to run up every year for producing grapes in the following year, cutting out the rods of the previous year's make at pruning time every year. I must say at once that I do not approve of this method. Some growers, again, take up two or three permanent rods from the main stem branching out at the bottom of the trellis, the rods being trained at from three to four feet apart, according to circumstances. There can be no question as to the advantages resulting from the

system of filling one house with from one to four vines, providing there is ample scope either in the way of made borders of prepared soils, or of natural soil of a suitable description for the roots to push into and feed on.

Say the vinery is a span, eighty feet long and thirty feet wide. A vine is planted in each corner and trained up under the roof glass to the trellis in the first year. At pruning time, the rods are shortened back a little, the side shoots being cut hard back, and then tied horizontally to the bottom of the trellis, in which direction the young leading growth is trained; side shoots being selected and trained up the trellis under the roof at from three to four feet apart to form individual main rods, these being stopped two or three times during the growing season in the manner recommended under the heading of "Disbudding and Stopping," the pruning being the same as advised for young vines in the first year, and so on in each succeeding year until the house is furnished with bearing wood. Supernumeraries planted at the same time as the four permanent vines would yield a fair crop of grapes in the following and succeeding years until the permanent vines came into bearing. One should root out or cut off close to the ground the temporary canes one after another, commencing at each corner of the house next to the permanent rods, as the latter furnish the space allotted to them on the trellis with bearing wood; completing the "rooting out process" in the middle of the vinery on either side. If more varieties than one are required in the house, grafting or inarching will satisfy the demand in a short space of time.

Bleeding

Young, vigorously-growing vines, even when the wood is thoroughly ripened, sometimes have a tendency to bleed, either immediately after being pruned, or

when subjected to a forcing temperature. The sap being slightly excited and having no other outlet, bleeding takes place.

If the wounds are seared with a hot iron where bleeding is anticipated, it will, as a rule, be prevented. A small potato pressed on the top of a young main rod of the vine will stop bleeding.

I have never experienced any difficulty in this direction myself, further than such as the two simple and always available remedies mentioned above were sufficient to cope with.

Suitable Stocks for Vines

The influence which the stock exercises on the scion is greater and of more consequence than many grape-growers are aware of. So great, indeed, is this influence that the character of a well-known grape—to wit, Gros Maroc—was altered so much in size and shape of bunch and berry, as well as in flavour, by reason of its union with a worthless foreign grape vine, that several expert grape growers to whom I showed it, together with a bunch of the same grape cut from a vine inarched on a Black Hamburg stock, failed to recognise it, while they readily recognised the bunch cut from the Hamburg stock placed in a bottle alongside it in the grape-room for comparison. This happened soon after the Gros Maroc grape was introduced into commerce. Being anxious to obtain a second rod of it, and a second shoot being available on the same pot-vine from which I inarched one on the Hamburg close by, I accordingly inarched the second shoot on the worthless vine referred to regardless of what the result of such a union would be. The vine in question was sent in mistake for a good variety, which an officer in command at Malta ordered to be sent home to me. Being anxious to test the variety as soon as possible, I took one bunch—

an apology for a bunch—off it in the following year. Hence my utilising the stock without paying any regard whatever, I admit, to the soundness or otherwise of such a union. However, I made known my experience forthwith for the benefit of readers of the horticultural press, and so eased my conscience in the matter.

Muscat of Alexandria is the very best stock on which to graft or inarch any other white grape. By such a union the flavour of any other white (excepting Canon Hall Muscat) grape will be improved; Black Hamburg and Madresfield will produce a like desirable change in the flavour of any late black grape (excepting Mrs Pince) engrafted or inarched thereon. The said stocks would be quite safe to work Mrs Pince on, and while not expecting the flavour of the latter to improve or suffer in any way, the colouring properties of the grape, which is oftener seen "foxy" than black when ripe, might be improved by such a union.

There are several modes of grafting practised, the two most important being known as whip grafting and crown or wedge grafting. Of the two I prefer the latter, on the score of simplicity and effectiveness. January or February is a good time to perform the operation on vines which have not yet been "started." The vine or vines on which it is desired to engraft some other variety of the grape should be headed back before the sap has risen, and then cut down the centre to the depth of four or five inches, and into this opening—it being kept open until the wedge-shaped graft, cut to a feather edge on the inner side, is ready—insert the graft; the broad side of the triangularly-shaped scion being kept flush with the stock. The stock and graft should be bound round with a few bands of raffia grass and covered with clay and cow manure made to the consistency of stiff putty. The covering should be put on so as completely to cover and exclude air

from the wounded surfaces. The sap rising in the stock will mix with that stored up in the scion, and thereby effect the desired union in the course of a couple of weeks. The same remarks apply to whip grafting. A downward cut extending about one and a half inches towards the centre of stock, as shown in the figure, baring the bark with an upward cut to the point where the first cut was made. This done, prepare the graft to correspond with the cuts made in the stock, tongueing the graft in the latter in the manner shown by the lines in our illustration, it being essential to success that the *two inner barks should fit well together*. Bind stock and graft, and otherwise treat as recommended above.

Inarching

This is a very easy, effective, and popular way of effecting a union of two distinct varieties of the grape-vine in a growing state. The vine to be inarched is generally grown in a pot. This is stood on the trellis stage over front pipes, on a shelf, or on a stool, as the case may be. A downward cut about one inch long is made in the stock, a corresponding one in an upward direction being made in the pot-vine, which is pressed open and tongued into the incision made in the stock, and bound round with matting, after which a little moss is tied round stock and scion, and damped two or three times a day for about a week, by which time it may be removed. Two weeks later the scion can be detached from the parent plant.

Patching Vines in Full Growth

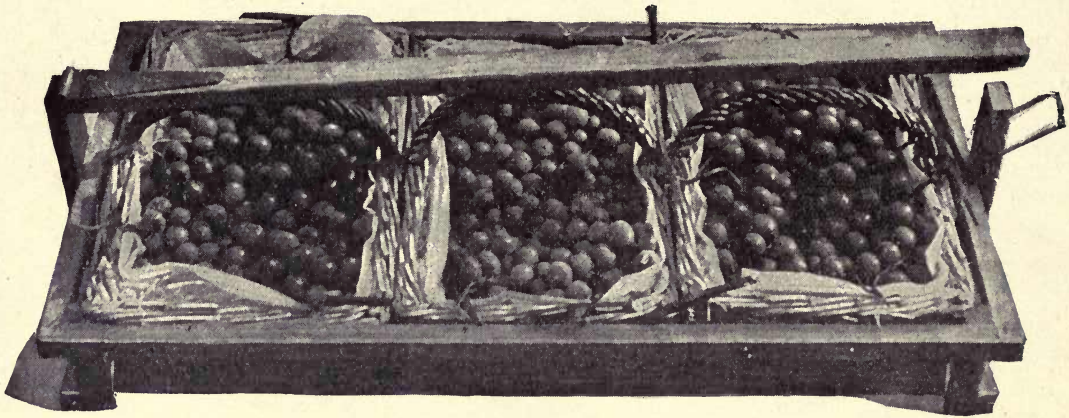
This consists in inarching shoots of the same vine to fill the gaps caused by the next buds above them not pushing into growth. I have on some occasions in the

case of young, strong-growing vines of Lady Downe's, inarched the same individual shoot, twice within one week, to fill the gaps made on the same side of the vine by two consecutive buds failing to start into growth. In this way vines which push into growth irregularly in the way indicated above, are easily and effectively patched, and good and natural-like spurs provided for the ensuing year. It is a trite saying that "necessity is the mother of invention." It was so in my case when it occurred to me many years ago to make good the blanks on my vines in the manner described above.

Packing Grapes

There are various ways of packing grapes to be sent away by rail and other means of transit. But the most popular as well as most efficient means of packing grapes for market are the common cross-handled peck baskets, and flats with baby baskets made to fit inside. The packing is done in this way:—A little wood-wool is placed in the bottom and round the sides of basket. This being covered with a couple of sheets of tissue paper, the bunches, having been cut with a few inches of wood attached on either side of the stems, are stood on their ends in the individual baskets close together round the sides, the stems being secured to the top edge of the baskets with a piece of fine string or matting. A sheet of tissue is then placed in the space in the centre of the basket against the bunches, and into this space are carefully and closely deposited as many bunches as can be conveniently lodged therein, always keeping the crowns of the bunches on a level with, or slightly below, the rims of the baskets. Cover the grapes with two or three double sheets of tissue, securing the paper in position with a few cross and longitudinal ties of matting. The address label, with the words "grapes

BASHFORD'S FRUIT PACKING CASE FOR CHOICE PRODUCE



A CRATE OF GRAPES DRAWN FROM BASHFORD'S FRUIT PACKING CASE

with care" printed thereon in red ink, being attached to each, every basket thus packed should reach its destination, whether fifty or two hundred miles distant, in the same condition as when despatched from home. The closer the bunches can be packed without rubbing the bloom, the better they will travel.

The "flats" referred to above are about twenty-two inches long, fifteen inches wide, and ten inches deep,

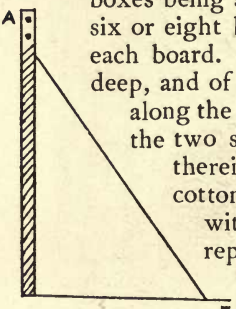
A BASKET USED IN BASHFORD'S FRUIT PACKING CASE

and are strongly made, the baby baskets of lighter make being made to fit closely but comfortably inside the flats. They are lined and packed in the manner indicated above, the bunches being also secured to the sides and ends of basket, and the grapes covered with paper.

When sending off grapes by parcel post in boxes or small baskets, packing should be done in the same way, with an additional covering of cotton-wool or wood-wool; the latter being more elastic than the former and consequently preferable.

Baskets containing twelve pounds of grapes for exhibition are packed in the manner described above, white tissue paper being used for black grapes and pink tissue for white grapes. Classes for baskets of black and white grapes respectively are provided by horticultural societies simply to encourage good packing, the condition of transit being that the baskets must be despatched by rail and delivered by the railway companies' servants.

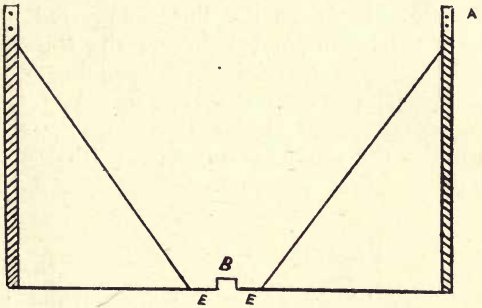
Grapes for exhibition are tied on specially made single boards covered with white and pink paper, according to the number of black and white grapes to be shown, boxes being specially made for the boards, to take six or eight bunches on either side, one bunch on each board. A strip of wood (B) about one inch deep, and of the same width, is nailed lengthwise along the middle of the bottom of the box to keep the two sets of boards in position when placed therein, the bunches resting on a pad of cotton wool. The top of the boards is flush with the ends and sides of the box, and represents an angle of from thirty degrees to forty degrees according to the depth and width of the box. Each box should be provided with a trunk lock and with handles at each end. When the bunches are secured to the top of the boards (A) with a piece of string and placed in the box, and the lid shut down, they cannot possibly move as long as the boxes are kept level. In this way I have frequently taken as many as fifty bunches of grapes from Longford Castle, Salisbury, to the Crystal Palace Fruit Show and back without having the bloom rubbed in the least degree—a distance of some two hundred miles. The foot (E) shown in the base of the grape boards is to allow room for the points of the individual bunches, while the space between the two



angles of each set of boards will allow ample room for body and shoulder of full, well-developed bunches without bringing them in contact one with the other.

Treatment of Vines in an Ordinary Greenhouse

Decent grapes may be grown in a greenhouse of either small or large dimensions by the exercise of forethought and judgment. A greenhouse generally contains flowering plants, and consequently requires a somewhat dry and airy atmosphere day and night during the late spring, summer, and early autumn months. Therefore



the vines cannot be syringed nor can the house be closed early, as recommended for vines growing in specially erected houses, as this would be very injurious to the flowering plants. However, assuming the vines to be growing in congenial soil and to be healthy and active at the roots, they make a more short-jointed, if less rapid, growth in a greenhouse on account of the free circulation of fresh air constantly playing among the vines day and night than they do in a vinery proper. Assuming that the vines are growing outside either in the natural soil

of the place or in prepared soil, and taken into the house through an opening made in the brickwork immediately under the wall-plate, liberal and frequent supplies of water should be given at the roots in the absence of rain as the vines advance in growth. Let there be no surface-watering, giving, on the contrary, sufficient each time that water is applied to moisten the soil about the roots. Applications of weak liquid manure at the roots during the growing season will greatly assist and benefit the vines in swelling and colouring their bunches. Occasional surface-dressings of Peruvian guano, Thomson's vine manure and soot, immediately followed by clear water at the roots, will render additional help in the same direction. Cropping and thinning of the bunches is to be carried out on the lines suggested under the heading of "Selecting and Thinning the Bunches;" the disbudding, stopping, training, and pruning of the vines being the same for vines growing in the greenhouse as already recommended under those headings. Grapes grown under the above-mentioned conditions will colour well and be of first-rate quality.

Fruiting Vines in Pots

These may be easily grown by anyone having a greenhouse and a fair knowledge of the requirements of the grape-vine as set forth in this book. The vines should be shifted out of the three-inch pots into six-inch ones, and again into ten or twelve inch ones (the fruiting pots) before the roots become matted. Great care should be exercised in the matter of giving water after each shift, until the roots have pushed well into the new soil, when the supply should be gradually increased, giving surface-dressings of the description indicated under the heading of "Treatment of Vines in an Ordinary Greenhouse," and in the manner there recommended.

When the vines are being established in the fruiting pots, they should be stopped at four, six, and eight feet, allowing them to make two feet of fresh growth in main stem between successive stoppings. This should be done in the manner advocated under the heading of "Disbudding and Stopping," pinching all lateral growths hard back persistently in order to concentrate the energies of the vines into the swelling of large, plump, filbert-like buds and the thickening of the individual canes. These, when grown under the roof glass exposed to plenty of light and with a free circulation of fresh air playing about them during the months of August, September and onwards, will become consolidated and well-ripened—conditions absolutely essential to fruitfulness in all kinds of fruit trees. The vines can be stood out of doors in October, plunging the pots to the rims in sifted coal-ashes in a sunny situation where water is not likely to accumulate at any time. A situation under a wall or fence having a south or west aspect would answer admirably, the canes being secured to stakes or to the wall or fence if available. In the following spring the vines can be taken indoors, the pots being stood on the front staging, or failing this, on two or more bricks, according to the distance from floor to wall-plate, and be trained up the rafters (one underneath each). However, in a general way, it is much better to obtain the vines direct from some grower having a reputation for the growth of pot-vines, such, for instance, as Messrs Keynes, Williams & Co., of Salisbury. The disbudding, training of shoots, etc., are to be performed as recommended under the several cultural headings.

Vines for Decoration

The grape-vine may be converted into a decorative subject for the dinner table, where the bunches of

purple and amber-coloured grapes depending among and below the handsome dark-green leaves of irregular and prettily serrated outline contrast most effectively with the surrounding objects. Being provided with a few well-grown vines for fruiting in twelve-inch pots when the vines are introduced to the forcing-house—that is, a vinery started in the ordinary way as regards heat and moisture—place a seven-inch pot over the rod, or rods, as the case may be. Should the holes in the bottoms of the pots be too small for slipping over the canes, the difficulty may easily be got over by enlarging them. This done, place a few small pieces of potsherds in the bottom round the rod; make a few slight incisions in the stem of the vine in an upward direction, fill the pot with mould, and into this insert a deal stake, tapering in an upward direction, and painted green, through which a few short lengths of strong wire have been previously run at right angles with each other to train the branches of the vine. Press the soil firmly round the stake, which should be quite upright. The small pot will get full of roots by the time that the grapes are ripe, when the young plant should be detached from the parent plant, and removed from the large pot. It is then available for placing in a suitable vase on the dinner table. Sometimes an arch is formed by two fruiting pot vines, which, when stood on a side-table in the dining-room, and secured in position by ties of small string fastened to the wainscot or the wall, has a good effect. In such a position, and secured in the manner indicated, I have frequently used both descriptions of decorative vines. The Black Hamburg, Buckland Sweetwater and Madresfield Court are suitable varieties for decorative work, and the same may be said of Gros Maroc, Black Alicante, Appley Towers and Diamond Jubilee.

Treatment of Vines on Walls and in the Open

It is within the reach of every cottager living in the country in every county in Great Britain and Ireland to sit under the shade of his own grape-vine. Of course, the southern, western, and eastern counties are more favourably situated for the culture and production of grapes out of doors than northern counties are. Still, northern counties have their own favourable positions, sloping to the south, south-west, or west, and sheltered from northerly and easterly winds, just as the southern, western, and eastern counties have; and in these positions fairly good grapes of the black cluster variety may be secured in most seasons. Of course, the most favourable positions are walls and fences facing due south, south-west, or west. If the available space of wall or fence to be covered with the grape-vine be, say, twelve feet wide (it does not matter about the height), plant one vine in the centre of this space in an excavated hole representing the half of a five feet in diameter circle and about two and a half feet deep. Place therein about six inches of brickbats and clinkers, or stones with a little gravel for drainage, covering this with turves, grassy side down, or, failing this, with long litter, to prevent the soil getting into the drainage. Fill this hole to within three inches of the top with prepared soil and in this plant the vine, spreading the roots well, like the distended fingers of the hand, shortening back straggling roots and cutting clean away any damaged portions, and then cover with six inches of soil. This will settle down a few inches within a few weeks from the time of planting, which may be done in February or March. Secure the vine to the wall or fence by means of nails and shreds.

After the vine has pushed well into growth, train the two lower young shoots of the vine right and left to

the wall or fence, at from eighteen to twenty-four inches from the ground, pinching the point out of the leading (upright) stems, to throw strength into the shoots which are being trained right and left in a horizontal position. Stop these at three feet in the manner described under the heading of "Treatment of Vines, First Year," training the young shoots resulting from these stoppings in an upright direction at five feet from the main stem, again stopping the young leaders at three feet from the main (horizontal) stem, and pinching all lateral growths or side shoots hard back to one joint from the point whence they start. At pruning time, shorten back the two main canes to within one foot of the vertical and horizontal curve—that point from which the shoots are trained in an upright position—cutting the wood spurs as well as the original central shoot back to the prominent buds at their bases.

When the vines push into growth towards the end of March or early in April, train four intermediate shoots in an upright position at two feet apart, afterwards stopping them as previously advised, and training the side shoots or fruiting growths at fifteen inches on the main rods, the laterals on one side of each main rod being retained anglewise to those on the other side. This, as stated under the heading of "Disbudding and Stopping," will afford more space to the developing growths than would be obtained had they been left opposite to each other on the individual canes. Crop lightly rather than the reverse in all cases of vine growing.

Vines may be fruited fairly well if planted in rows three to four feet apart and at two feet asunder in the rows in good, rich, loamy soil sloping southward or in a south-westerly direction, and sheltered from the north and east winds by a belt of trees or high hedge, the vines being trained to four lines of No. 10 galvanised

wire (painted three coats of good whitelead paint beforehand) stapled on to stout posts set well into the ground at intervals close enough to admit of the wires being strained sufficiently tight to give stability to the trellis. When the vines are planted, lay on a surface dressing of short manure to the thickness of three inches between the rows and the vines in the rows. The top wire should be about four feet from the ground, the others being fixed one foot apart. The canes should be treated as advised for vines under glass in the way of disbudding, stopping and pruning, the rods being, say, four and a half feet long, instead of four times that length.

Diseases to which Vines are Subject

Of these, *Mildew* (Oidium Tuckeri) is the most common, as well as the most troublesome, in cool vineries. Dryness at the roots will produce mildew on the leaves of trees and plants susceptible to its attacks in dry, hot summers, out of doors as well as under glass, but the appearance of mildew on young growths of vines and peaches is generally caused by a low and too moist atmosphere, that is, by a spell of cold, dull, showery weather during the growing season. The only remedy for vines and other plants attacked by this parasite or fungus out of doors and in cool houses is to dust the affected leaves while damp with flowers of sulphur, and, weather permitting, to ventilate freely and endeavour to keep the atmosphere of the house quite dry until the grey powdery spots and blotches on the leaves and berries have turned brown. Where vineries are heated with hot-water pipes, the getting rid of the mildew pest is a very simple and easy matter. A few handfuls of flowers of sulphur should be stirred into a vessel containing lime-wash, and applied to the heated pipes with a brush

shortly before dark, but *not* before the sun has gone off the vinery. The house, being dry and closed at the time, will quickly become filled with the sulphury fumes. The fire should be kept going hard for a couple of hours, so as to run the temperature up to eighty-two degrees, but not higher. The fire should, at the expiration of two hours (with the temperature at the point indicated), be slackened and a little air put on. Heating the pipes and closing the vinery in the manner described for two or three evenings in succession, and ventilating rather freely on the following days, weather permitting, will exterminate the mildew.

Mealy-bug (Dactylopius adonidum).—Once this very undesirable and objectionable-looking creature effects a lodgment on vines, it is difficult to dislodge or extirpate. The most effectual, and at the same time simple, remedy known is thoroughly to smear the affected vines with a mixture of coal-tar and clay, using one part of the former to nine parts of the latter. The clay should be dried and powdered, so that it may be passed through a quarter-inch sieve; then measure the pulverised clay into a large flower-pot (having a lump of stiffish clay put into the hole in the bottom), using a three-inch flower-pot as a measure, and putting the measure of tar into the vessel after the specified quantity of clay has been deposited therein. Then work the mixture well together, afterwards adding sufficient boiling water to give it the consistency of ordinary paint; apply the mixture with a stiffish paint-brush to every crevice about the spurs and every portion of the affected vines, keeping the mixture well stirred meanwhile.

Red Spider (Tetranychus telarius) is caused by a high and too dry atmospheric temperature being unwittingly maintained, or by the soil being too dry at the roots of the vines or plants affected, or by all three conditions

together. The remedy is to give sufficient water at the roots to moisten the soil, and syringing the leaves with tepid water, or sponging the affected leaves (both upper and lower surfaces) with soft soapy water; the most radical remedy, however, being the sulphuring of the pipes, as recommended for mildew. But before having recourse to the remedy last mentioned, it would be well to fumigate with nicotine compound (XL-ALL vaporising compound), and afterwards to maintain a more humid atmosphere until the grapes begin to colour.

Thrips (Thrips minutissima) attack vines growing in houses heated by hot-water pipes and flues, and not unfrequently both thrips and red spider are introduced into vineries by growing in them French beans, strawberries, and azaleas (to make fresh growths after the flowering period is over). The same cause or causes answerable for the presence of red spider, may also account for the presence of thrips. Fumigate with XL-ALL vaporising compound in the evening after the sun has gone off the vinery. This is more effective in one fumigation than is fumigation by tobacco on three evenings in succession, and, moreover, there is no objectionable smell of burnt tobacco experienced on the morning after fumigation by the vaporising compound, as is the case after fumigation with tobacco paper. Give air somewhat freely, weather permitting, on the day following fumigation, and maintain a moist growing temperature. Red spider and thrips seldom attack vines growing in cool houses or out of doors if kept properly supplied with water at the roots.

The *Vine Louse* (Phylloxera vastatrix) is the most virulent as well as the most formidable insect pest to the attacks of which the vine is heir. This I know by having, in 1879-80, had considerable practical experience of the pest in five out of seven or eight vineries at Longford Castle. As the result of several carefully-made

experiments with a view to destroying the insect without at the same time injuring the vines, I arrived at the conclusion that any fluid which is strong enough to kill the insect on the roots in its rapid passage through the soil will also kill the vines operated on. I am also convinced that where vine borders can be submerged for five or six days at the end of July, and again a fortnight later when the Phylloxera is in full activity, and by repeating the flooding process after an interval of a fortnight, the brood which came into active existence immediately after the vine borders were first flooded, will also be exterminated. Of course the submerging cure only applies to vines whose roots only are infested with the Phylloxera. If the leaves also are affected by the pest, the flooding would not, as a matter of course, affect them. It is much better, where the flooding of the borders cannot be done at the time and for the period indicated, and there is no Phylloxera on the vines above ground, to adopt the "stamping-out" process—that is, as soon as the grapes are cut, to root out the vines, remove the soil down to the drainage, scrub and wash the brickwork two or three times with hot lime, thoroughly wash the glass and woodwork, and then paint the latter, afterwards strewing one inch of coarse salt over the drainage so as to reach any affected roots concealed therein. In the following year—assuming the vines operated on to be late bearing varieties—make a fresh border or section of a border in the manner recommended under the heading of "When and how to make a Vine Border," and plant therein fresh clean vines, obtained from someone having a reputation for sending out perfectly clean vines, true to name, planting in the manner advocated under the heading of "How and when to Plant Vines."

Rust on Grapes.—I do not look upon rust on grapes as being a disease, though it is so termed by some authorities the grape. It is purely and simply the result of care-

lessness. It may be caused by handling the berries while being thinned or by draughts of cold air, but the most likely cause of rust is the application of sulphur to the hot-water pipes soon after the grapes have set—a stage of growth when the berries are very susceptible to injury from coming in contact with the hand, clothing, hair of the thinner's head or cold currents of air, but more especially by being subjected to a sent-up volume of hot sulphurated air for a period of two hours. Should there be occasion to apply sulphur to the hot-water pipes after the berries have stoned, or even during the process of stoning, it may be done with perfect safety if done in the manner recommended for mildew.

Warts on back of Leaves.—The appearance of conglomerate excrescences on the back of vine leaves is answerable for the name "warts," under which these symptoms are known. The so-called "warts" may be the result of some sudden change in the way of heat and moisture—young, strong, free-growing vines being subjected to a rather close, high temperature, surcharged with moisture, have the flow of sap excited in the young leaves to such an extent as to rupture the epidermis, resulting in the exudation of sap and the formation of the so-called warts.

In order to prevent the spread of these excrescences, reverse somewhat the atmospheric conditions by distributing only sufficient water in the house to produce and maintain a growing atmospheric temperature, and by admitting a free circulation of fresh air during the heat of the day. The application of sulphur to the hot-water pipes would cause the disorganised organic warty matter to turn brown. But the case does not call for special consideration in this direction. Growers should guard as much as possible against having cause for applying liquid sulphur to highly-heated pipes or for fumigation by tobacco, or even by nicotine compound.

They should bear in mind the old axiom, "Prevention is better than cure."

Air Roots on Vines.—These proceed from one or both of two causes. An atmosphere kept uniformly surcharged with moisture and close as well, will produce an abundance of air roots, especially if the roots of the vines are growing in cold, poor, uncongenial soil—conditions by no means calculated to conduce to healthy root action. Hence the appearance of the unnatural roots, accelerated by the close, high, and too moist atmosphere—conditions in themselves almost sufficient to account for the presence of air roots on vines having plenty of healthy roots and of good, suitable soil to push into.

Scalding.—Injury of this description is caused to some varieties of grapes by the sun shining on the bunches when covered with moisture before top air is put on in the morning, or after it is taken off in the afternoon. White Muscats and Lady Downe's Seedlings are the varieties most susceptible to injury in this direction. To prevent this undesirable disfiguration of the otherwise solid, handsome bunches, put a little air on vineries having the ends fully exposed to the east at 7.30 in the morning, the other houses in the same range of lean-to's being given a little air somewhat later. Leave top air on about twenty minutes longer on the western end of the range, at shutting-up time the east end section being closed first, and so on to the last division. The same remarks apply to span vineries running north and south with the roof glass facing due east and west respectively, giving in each case abundance of air during the heat of the day. Thus treated, scalding of the berries of the two varieties indicated will be prevented.

Shanking.—The shanking of full, even-sized bunches is very annoying to grape growers whose grapes behave

in this manner. "Shanking" may be accounted for in this way:—The vines, being in an unsatisfactory state at the roots, consequent upon bad drainage and unsuitable compost for the vines to establish their roots, therefore, at the critical moment the supply of sap passing between root and branch gives out—*i.e.* is inadequate to the demands of expanding leaves and developing bunches—and consequently the stems, sometimes half way up the bunch from the point, become discoloured and shrivelled. If such vines are heavily cropped, of course it makes matters worse. In short, strong, healthy vines, with a network of hungry roots pushing into congenial sustaining soil, and judiciously cropped and cared for, will not shank in the bunches.

Wasps and Flies are very troublesome when the grapes are ripe. These may be caught in narrow-necked bottles or glasses specially made for the purpose, nearly filled with sweetened beer or treacle, and suspended among the vines. A good old-fashioned, most effective and simple means of saving all kinds of fruit, from the grape to the gooseberry, from the ravages of wasps and flies, is to place one or more pairs of ordinary hand-glasses, close to the positions to be protected, on three bricks, with some damaged fruit underneath as a bait. Make a small hole in the top of the cover, and then place another hand-glass (frame and cover) over the first, setting it on a little moss to insure its fitting well on the lower one. The insects, being attracted by the ripe, damaged fruit placed therein, enter through the openings afforded by the bricks, and in due time pass through the hole in the top of the inner glass into the outer one, in which, being air-tight, they perish.

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